Cessna

"LOOK FOR THE RED AND BLUE CESSNA PENNANTS FOR THAT EXTRA SERVICE WHERE IT COUNTS WHEN YOU NEED IT".

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS

Cessna

1963

205 AAA

MODEL 205

OWNER'S MANUAL

PERFORMANCE - SPECIFICATIONS

	MODEL 205
GROSS WEIGHT	3300 lbs
SPEED, BEST POWER MIXTURE:	
Top Speed at Sea Level	173 mph
Cruise, 75% Power at 6500 ft	163 mph
RANGE, NORMAL LEAN MIXTURE:	
Cruise, 75% Power at 6500 ft	730 mi
63.5 Gallons, No Reserve	4.5 hrs
	162 mph
Cruise, 75% Power at 6500 ft	920 mi
80 Gallons, No Reserve	5.7 hrs
	162 mph
Optimum Range at 10,000 ft	1015 mi
63.5 Gallons, No Reserve	8.9 hrs
	114 mph
Optimum Range at 10,000 ft	1275 mi
80 Gallons, No Reserve	11.2 hrs
	114 mph
RATE OF CLIMB AT SEA LEVEL	965 fpm
SERVICE CEILING	16,100 ft
TAKE-OFF:	
Ground Run	685 ft
Total Distance Over 50-foot Obstacle	1465 ft
LANDING:	
Landing Roll	625 ft
Total Distance Over 50-foot Obstacle	1510 ft
EMPTY WEIGHT (6-passenger version)	1750 lbs
USEFUL LOAD	1550 lbs
WING LOADING: Pounds/Sq Foot	18.8 lbs
POWER LOADING: Pounds/HP	12.7 lbs
FUEL CAPACITY: Total	
Standard Tanks	65 gal.
Optional Long Range Tanks	84 gal.
OIL CAPACITY: Total	12 qts
PROPELLER: Constant Speed, Dia	82 inches
POWER:	
Continental Fuel Injection Engine	IO-470-S
260 rated HP at 2625 RPM	

Congratulations . . . . . .

Welcome to the ranks of Cessna owners! Your Cessna has been designed and constructed to give you the most in performance, economy, and comfort. You will find flying it, either for business or pleasure, a pleasant and profitable experience.

This Owner's Manual has been prepared as a guide to help you get the most pleasure and utility from your airplane. It contains information about your Cessna's equipment, operating procedures, and performance; and suggestions for its servicing and care. We urge you to read it from cover to cover, and to refer to it frequently.

Our interest in your flying pleasure has not ceased with your purchase of a Cessna. World-wide, the Cessna Dealer Organization backed by the Cessna Service Department stands ready to serve you. The following services are offered only by your Cessna Dealer:

FACTORY TRAINED MECHANICS to provide you with courteous expert service.

FACTORY APPROVED SERVICE EQUIPMENT to provide you with the most efficient and accurate workmanship possible.

A STOCK OF GENUINE CESSNA SERVICE PARTS on hand when you need them.

THE LATEST AUTHORITATIVE INFORMATION FOR SERVICING CESSNA AIRPLANES, since Cessna Dealers have all of the Service Manuals and Parts Catalogs, kept current by Service Letters and Service News Letters published by Cessna Aircraft Company.

We urge all Cessna owners to use the Cessna Dealer Organization to the fullest.

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TABLE OF CONTENTS

Page

SECTION I - DESCRIPTION 1-1

SECTION II - OPERATING CHECK LIST 2-1

SECTION III - OPERATING DETAILS 3-1

SECTION IV - OPERATING LIMITATIONS 4-1

SECTION V - CARE OF THE AIRPLANE 5-1

DEALER FOLLOW-UP SYSTEM 5-6

SECTION VI - OPERATIONAL DATA 6-1

SECTION VII - OPTIONAL SYSTEMS 7-1

RADIO SELECTOR SWITCHES 7-1

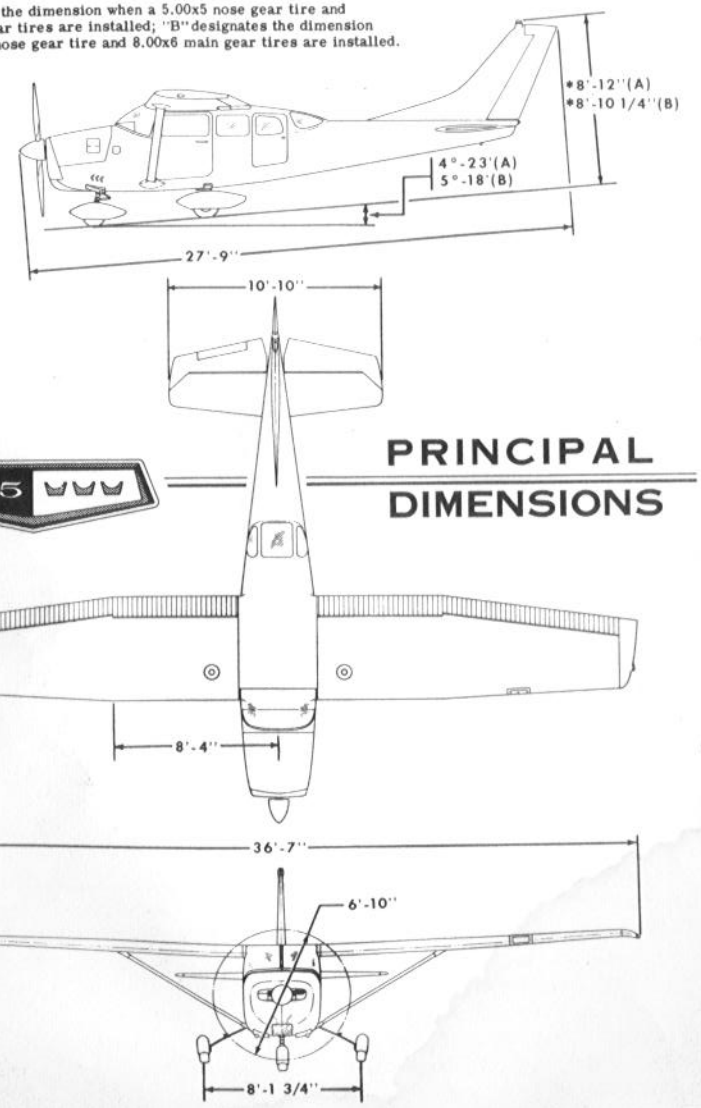
NAV-O-MATIC 7-3

OXYGEN SYSTEM 7-9

ALPHABETICAL INDEX Index-1

*Height of airplane with optional rotating beacon installed.

"A" designates the dimension when a 5.00x5 nose gear tire and 6.00x6 main gear tires are installed; "B" designates the dimension when a 6.00x6 nose gear tire and 8.00x6 main gear tires are installed.



PRINCIPAL DIMENSIONS

Section 1

DESCRIPTION

One of the first steps in obtaining the utmost performance, service, and flying enjoyment from your Cessna is to familiarize yourself with your airplane's equipment, systems, and controls. This can best be done by reviewing this equipment while sitting in the airplane. Those items whose function and operation are not obvious are covered herein.

ENGINE CONTROLS.

THROTTLE, MIXTURE AND PROPELLER CONTROLS.

The push-pull throttle incorporates a lock button to secure it in any desired setting. To operate the throttle, depress the lock button, then adjust the control knob as necessary. Release pressure on the lock button to lock the control. To make minor adjustments simply screw the control in or out without pressing the button.

The push-pull mixture control incorporates a lock button to prevent inadvertent leaning or shutting off the fuel supply. To operate the control, depress the lock button, then push the knob in for rich mixture or pull it out for lean mixture. Pulling the knob all the way out is idle cut-off for stopping the engine. Release pressure on the lock button to lock the control. To make minor adjustments simply screw the control in or out without pressing the button.

The propeller control is the push-pull type and changes the setting of the propeller governor to regulate engine speed. It is identical, in operation, to the mixture control. Pushing the knob forward increases RPM; pulling the knob out decreases RPM.

For all ground operations, and for take-off, the propeller control should be full in (high RPM). After take-off, reduce throttle first, then reduce RPM. Since a small control movement will produce a considerable RPM change, you should set up climb and cruise RPM by screwing the knob in or out.

Propeller surging (RPM variation up and down several times before engine smooths out and becomes steady) can be prevented by smooth throttle and propeller control knob operation. Do not change the throttle and propeller control settings with jerky and rapid motions.

INDUCTION HOT AIR KNOB.

The induction hot air knob is used

to select either filtered cold air from the induction air scoop or heated air. In the unlikely event that ice should form in the induction system, as evidenced by an unexplained drop in manifold pressure, pull the induction hot air knob full out. Do not use an intermediate position.

IGNITION-STARTER SWITCH.

A five-position ignition-starter switch controls the dual magneto ignition and starter systems. The switch positions are labeled clockwise as follows: "OFF," "R," "L," "BOTH" and "START."

The engine should be operated on both magnetos ("BOTH" position). The "R" and "L" positions are for checking purposes only. When the switch is turned to the spring-loaded "START" position, the starter turns over the engine for starting. As the switch is released, it automatically returns to "BOTH."

Refer to Sections II and III for further discussion on the use of the ignition-starter switch.

ENGINE INSTRUMENTS.

FUEL FLOW INDICATOR.

The fuel flow indicator used with the Continental fuel injection system is a fuel pressure gage calibrated to indicate the approximate gallons per hour of fuel being metered to the engine.

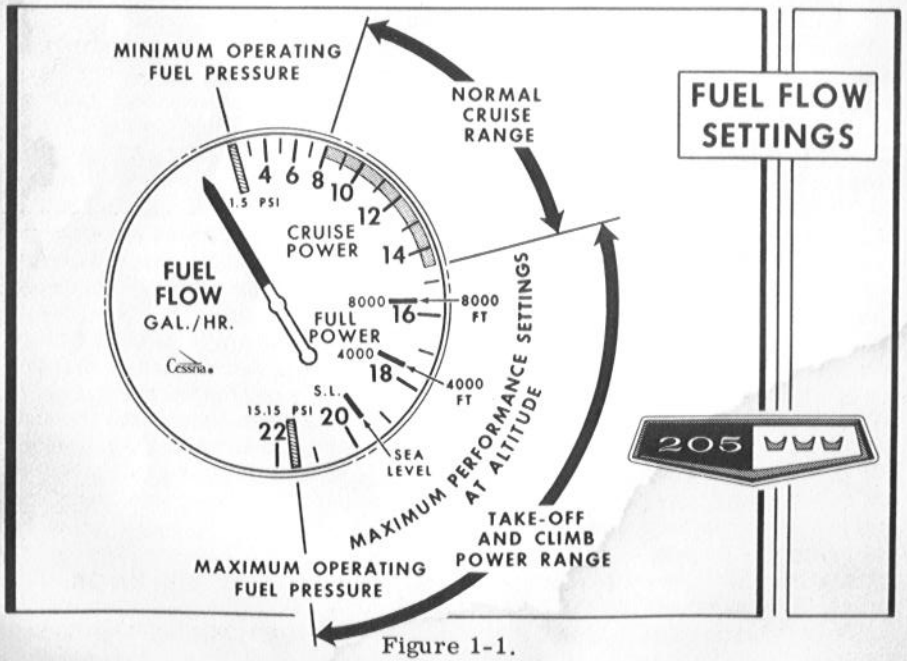


Figure 1-1.

The indicator dial is marked with red radials at the minimum and maximum allowable operating fuel pressures. The low flow range of the indicator has a green arc for normal cruise fuel flows while the high flow portion has white radial lines for take-off and climb settings for full power at various altitudes. The full power markings represent maximum performance mixtures for the altitudes shown, making it practical to lean the mixture on a high altitude take-off and during full power climbs for maximum power and performance.

In the cruise power range the green arc covers the normal lean fuel flow required from 45 to 75% power. Your Cessna Power Computer or the cruise performance tables on pages 6-4 thru 6-8 show the normal lean fuel flow for cruising power settings.

NOTE

Best power mixture can be obtained for any power setting shown on your Cessna Power Computer by adding 1 GPH to the normal lean fuel flow on the computer.

Cruising climbs (page 3-5) should be conducted at approximately 15 GPH up to 6500 feet and at 1 GPH more than the normal lean fuel flow shown on the Cessna Power Computer at higher altitudes and lower powers.

COWL FLAPS.

Cowl flaps, adjusted to the need, will meter enough air for the adequate cooling and maximum efficiency of the engine under varying conditions. Opening the cowl flaps, while on the ground, steps up the volume of air necessary for engine cooling. In flight, closing the cowl flaps, as required, restricts the flow of air through the engine compartment, thereby reducing the cooling and cowl flap drag to a minimum.

The cowl flaps are controlled by a lever on the control pedestal. Nine positions, including full open and full closed, are provided by means of locking holes in the lever mechanism. To change the cowl flap settings, move the lever to the left, out of the locking hole, then reposition. Make sure the lever moves into the locking hole at the new setting.

FUEL SYSTEM.

Fuel is supplied to the engine from two tanks, one in each wing (refer to figure 1-3). From each tank, fuel flows by gravity through a fuel reservoir tank to the fuel selector valve. Depending upon the setting of the selector valve, fuel from the left or right tank flows through a fuel strainer and check valve in the electric auxiliary fuel pump to the engine-driven fuel pump, by-passing the electric fuel pump when it is not operating. Pressurized fuel from the engine-driven fuel pump then flows through a fuel unit to a distributor manifold which disperses the fuel to a fuel nozzle on each engine cylinder.

FUEL QUANTITY DATA (U.S. GALLONS)

SELECTOR VALVE POSITION	USABLE FUEL (ALL FLIGHT CONDITIONS)	USABLE FUEL (LEVEL FLIGHT ONLY)	USABLE FUEL (CLIMBING-DESCENDING)	TOTAL VOLUME
STANDARD TANKS				
LEFT TANK	31.7	31.9	32.4	32.5
RIGHT TANK	31.7	31.9	32.4	32.5
LONG RANGE TANKS (OPTIONAL)				
LEFT TANK	40.0	41.0	41.9	42.0
RIGHT TANK	40.0	41.0	41.9	42.0

DECREASE IN USABLE FUEL IN ALL FLIGHT CONDITIONS IS DUE TO DETRIMENTAL EFFECTS OF UNCOORDINATED FLIGHT (SLIPS OR SKIDS) OR TURBULENT AIR THAT MAY BE ENCOUNTERED IN NORMAL FLYING CONDITIONS.

Figure 1-2.

Vapor and excess fuel from the engine-driven fuel pump and fuel metering unit are returned to the main tank being used by way of the selector valve and reservoir tank.

Refer to figure 1-2 for fuel quantity data. See the Servicing Diagram (figure 5-1) for a summary of fuel system servicing information.

FUEL SELECTOR VALVE.

The rotary-type fuel selector valve has three positions, labeled "BOTH OFF," "LEFT ON" and "RIGHT ON." The "BOTH OFF" position seals both wing tanks off from the rest of the fuel system and allows no fuel to pass beyond the selector valve. The "LEFT ON" position provides fuel flow from the left tank to the engine. Similarly, the "RIGHT ON" position provides flow from the right tank to the engine. Both the fuel feed and vapor return lines for each tank go through the selector valve, so that fuel returns to the tank from which it is drawn. Fuel cannot be used from both tanks simultaneously.

NOTE

The fuel selector valve handle indicates the setting of the valve by its position above the dial. Take-off and land with the handle turned to the fullest tank.

AUXILIARY FUEL PUMP SWITCH.

The auxiliary fuel pump switch controls the electric auxiliary pump which supplies fuel flow for starting and for engine operation if the engine-driven pump should fail. The switch is a split rocker type.

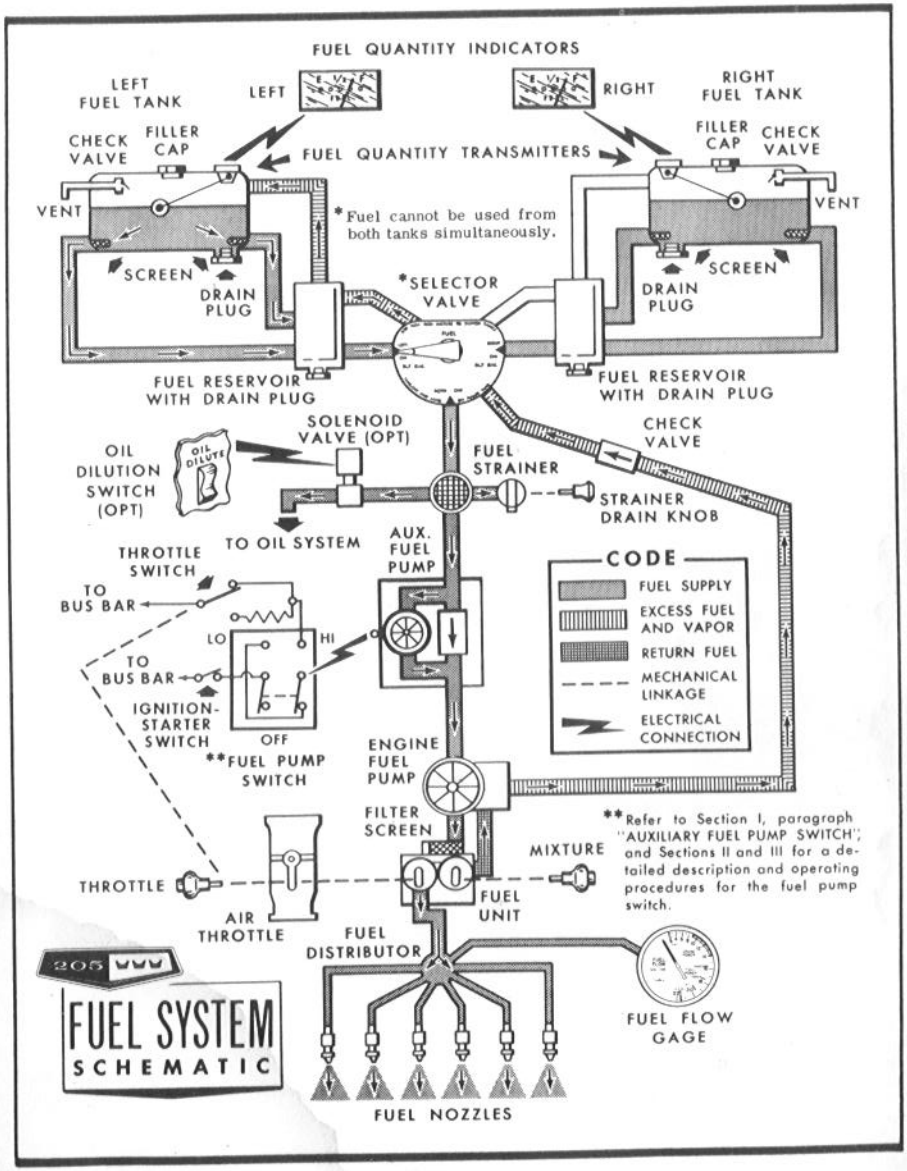


Figure 1-3.

The right half of the switch, labeled "LO," is used for starting. With the switch in the "LO" position, and the ignition-starter switch turned to "START," the auxiliary fuel pump will operate at a low flow rate (providing proper fuel mixture for starting) as the engine is being turned over with the starter.

NOTE

The auxiliary fuel pump will not operate in the "LO" position until the ignition switch is turned to the "START" position.

The left half of the switch, labeled "HI," is used for engine operation if the engine-driven pump should fail. When the switch is in this position, the pump can operate at two flow rates depending upon the setting of the throttle. With the throttle at a cruise setting, the pump is operating at maximum capacity, supplying sufficient fuel flow to maintain flight. When the throttle is moved toward the closed position, as during let-down, landing and taxiing, a mechanically-actuated switch electrically reduces the auxiliary fuel pump flow rate by means of a resistor in the pump power circuit. This action automatically prevents an excessively rich mixture during these periods of reduced engine speed.

The auxiliary fuel pump is not to be turned on "HI" during normal operation, because, with the engine driven pump functioning, a fuel/air ratio considerably richer than best power is produced.

NOTE

If the auxiliary fuel pump switch is accidentally turned on "HI" (with master switch on) with the engine stopped, intake manifolds will be flooded unless the mixture is in idle cut-off.

FUEL QUANTITY INDICATORS.

Two electrically-operated fuel quantity indicators are provided, each working in conjunction with an electric fuel level transmitter in its respective fuel tank. Turned on by the master switch, the indicators continue to function until the master switch is turned off.

FUEL STRAINER DRAIN KNOB.

The fuel strainer drain knob marked "STRAINER DRAIN" provides a quick, convenient method of draining water and sediment that may have collected in the fuel strainer. The strainer is located below the engine just aft of the radio compartment.

About two ounces of fuel (3 to 4 seconds of drain knob operation) should be drained from the strainer before the initial flight of the day to insure against the presence of water or sediment in the fuel.

The spring-loaded drain valve in the strainer is open when the fuel strainer drain knob is pulled out all the way. The valve automatically closes when the knob is released.

ELECTRICAL SYSTEM.

Electrical energy is supplied by

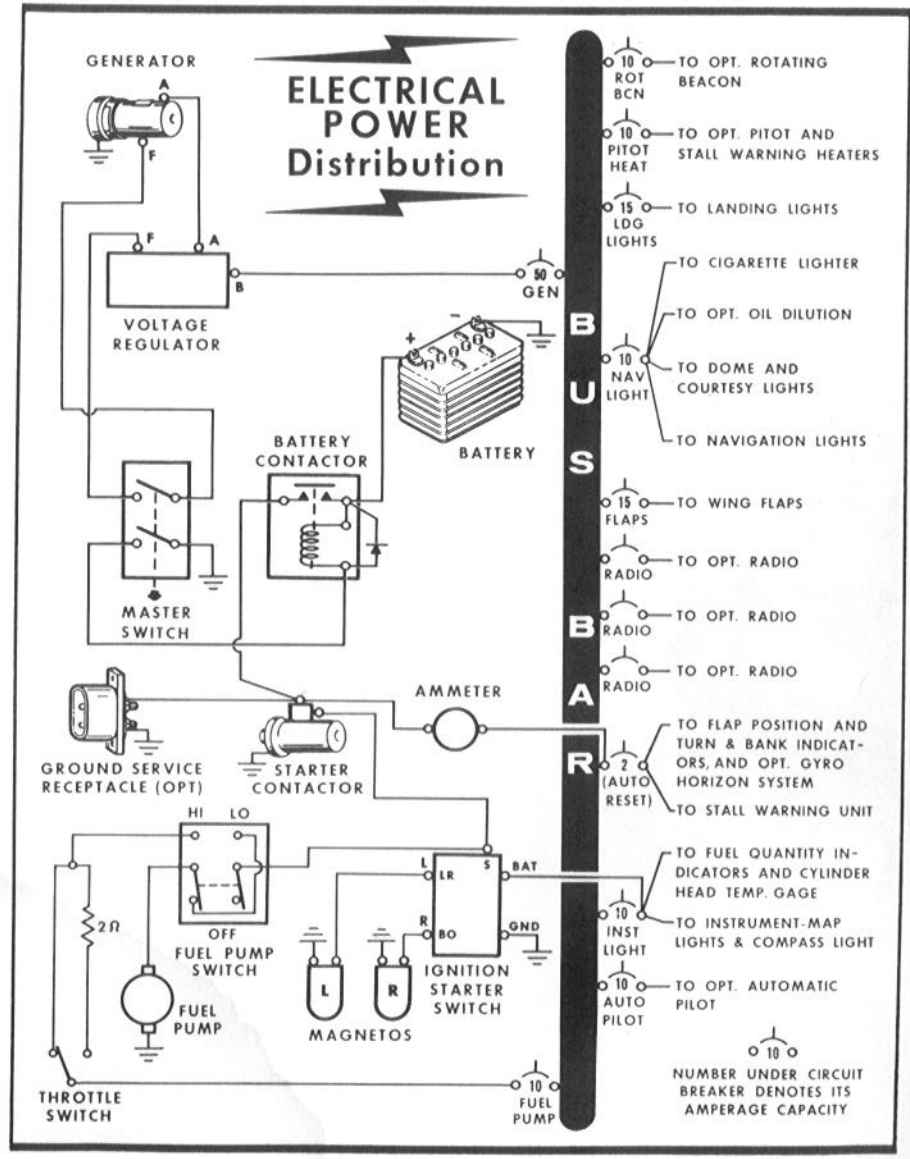


Figure 1-4.

a 12-volt, direct-current system powered by a 50-ampere engine-driven generator. The 12-volt storage battery is located on the upper right-hand forward portion of the firewall.

CIRCUIT BREAKERS.

All electrical circuits in the airplane are protected by circuit breakers. The stall warning unit, flap position indicator, turn-and-bank indicator and the optional gyro horizon test lights circuits are protected by a single automatically resetting circuit breaker mounted behind the instrument panel. The remaining circuits are protected by "push-to-reset" breakers on the instrument panel. These can be pulled out to isolate the circuit. The name of the circuit is shown above each circuit breaker.

LANDING LIGHTS.

The landing lights switch is the split rocker type. To turn on one lamp for taxiing, push the right half of the switch "ON." To turn on both lamps for landing, push the left half of the switch "ON."

NAVIGATION LIGHTS.

The navigation light switch is the split rocker type. For flashing navigation lights, push the right half of the switch "ON." For steady navigation lights, push the left half of the switch "ON." To switch from steady to flashing, push the left half of the switch "OFF."

STALL WARNING INDICATOR.

The stall warning indicator is an electric horn controlled by a transmitter unit in the leading edge of the left wing. This system is in operation whenever the master switch is turned on. The transmitter responds to changes in the airflow over the leading edge of the wing as a stall is approached. In straight-ahead and turning flight, the warning horn will sound 5 to 10 MPH ahead of the stall.

Under safe flight conditions, the only time you may hear the warning horn will be a short beep as you land.

WING FLAPS.

The wing flaps switch controls the position of the electrically-operated wing flaps. The "UP" and "DOWN" positions of the switch are momentary hold-on positions; the switch automatically returns to the center (off) position when released. The flaps can be lowered or raised to any position between 0° and 40°, and stopped at any position by allowing the switch to return to the centered (off) position. The flaps will remain in the selected position until the switch is moved to raise or lower them. Flap position is shown by an electric flap position indicator on the instrument panel.

CABIN HEATING AND VENTILATING SYSTEM.

Fresh air for heating and ventilating the cabin is supplied by a manifold cabin heater and two ventilating air scoops, one on each side of the fuselage just forward of the cabin door.

The temperature and amount of air entering the cabin is controlled by three knobs on the instrument panel. The "CABIN HEAT" knob operates a heat inlet valve at the firewall to regulate the amount of heat entering the cabin from the manifold heater. The "CABIN AIR" knob operates the air scoop on the left side of the fuselage to regulate the amount of fresh air entering the cabin. Fresh air from this air scoop is used in conjunction with heat from the manifold heater for mixing the correct amount of heat and airflow into the cabin. The "AUX. CABIN AIR" knob operates the air scoop on the right side of the fuselage providing additional outside air for summer ventilation. All three control knobs are the double-button type having friction locks to permit intermediate settings. To operate the control knobs, squeeze the buttons, releasing the locks; then adjust the knobs.

For cabin ventilation, pull the "CABIN AIR" knob out. To raise the air temperature, pull the "CABIN HEAT" knob out approximately 1/2" for a small amount of heat. Additional heat is available by pulling the "CABIN HEAT" knob out farther; maximum heat is available with the "CABIN HEAT" knob pulled full out and the "CABIN AIR" knob pushed full in. The temperature and amount of flow into the cabin can be regulated to any degree desired by manipulation of these two controls in relation to each other. When additional ventilating air is desired, pull the "AUX. CABIN AIR" knob out.

A rotary type control knob, labeled "DEFROST" regulates the airflow for windshield defrosting. With the control knob rotated full counter-clockwise, the flow of defrosting air is shut off; rotation of the knob clockwise permits air flow to the windshield, the amount depending upon the degree of rotation toward full open. The temperature of defrosting air is dependent upon the setting of the "CABIN AIR" and "CABIN HEAT" knob.

Two ventilators, one in each upper corner of the windshield, are provided to supply additional ventilating air for the pilot and front seat passenger. To operate, pull the ventilator out and rotate to the desired position. Four additional ball and socket ventilators are installed in the ceiling of the rear cabin area, for ventilation to the rear seat passengers. To regulate the flow of air, turn the knurled ring on the rim of the ventilator.

CABIN AND BAGGAGE DOORS.

Two cabin doors are provided, each incorporating a flush-type door handle on the outside and a conventional door handle on the inside. Both doors can be locked from the inside by rotating the inside door handles forward and down as far as they will go. Also, the left door can be locked from the outside by means of a key-operated lock. The same key that is used for the ignition also locks the cabin door, as well as the baggage door.

A door stop in the front edge of each

cabin door will hold the door open for easy loading. To engage the door stop, swing the door out to the limit of its travel and release. The stop disengages as the door is pulled shut.

The baggage compartment is accessible from outside the aircraft through a door in the left side of the fuselage. The door is hinged at the front and the latch is fitted with a flush-type outside handle similar to the cabin door handle. An inside door latch handle is also provided. The door is large and quite suitable for loading and unloading of passengers in the fifth and sixth seats. As an added safety factor when children are occupying these seats, the door may be locked from the outside to prevent them opening the door from the inside.

A limit cable at the top of the baggage door allows the door to be opened approximately 90°, thus preventing its being opened against the fuselage.

SEATS.

All seats are quickly and easily removed for custom loading of the airplane. To remove the two front seats; first, remove the stops at each end of the tracks, pull up on the seat position lever and slide the seat forward until the front legs can be raised slightly above the tracks, then slide the seat aft to the end of the track and lift the seat out. To remove the center seats; remove the front stops, pull up on the seat position lever and slide the seat forward free of the track. To remove the aft seats; pull up on the locking handle, push the seat back about one inch to disengage the aft legs from the anchor plates, align the front outboard leg of the seat with the notch in the track and lift the seat.

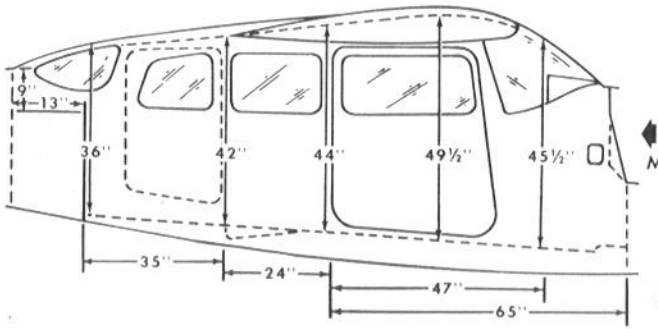
To install the front and center seats reverse the removal procedure. Check to be sure all stops are installed. To install the aft seats; position the seat with the aft legs just behind the anchor plates, align the front outboard leg with the notch in the aft outboard seat rail, pull up on the lock handle and slide the seat forward on the rail until the locking pin engages the hole in the track. Check to see that the aft legs are secure in the anchor plates. The aft seat position is not adjustable; the locking handle should not be pulled except to remove the seat.

INTERNAL CABIN DIMENSIONS

205

DOOR OPENING DIMENSIONS

	WIDTH (TOP)	WIDTH (BOTTOM)	HEIGHT (FRONT)	HEIGHT (REAR)
CABIN DOOR	32½"	37"	41"	39¼"
BAGGAGE DOOR	20¼"	20¼"	32½"	30"



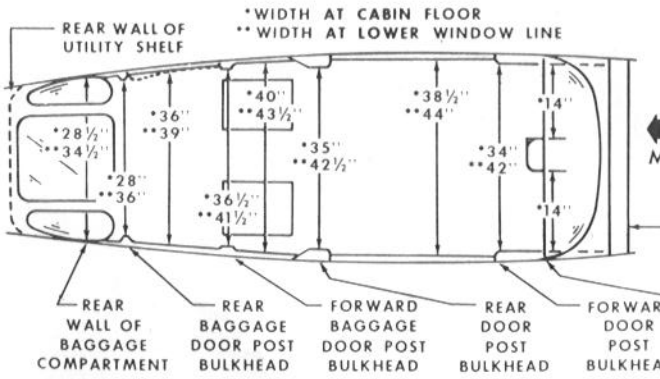
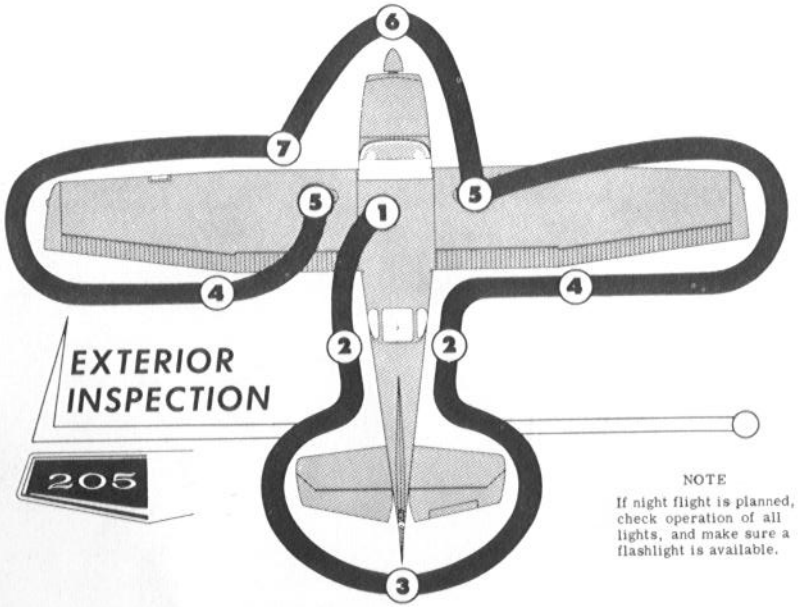


Figure 1-5.



(1) a. Turn on master switch and check fuel quantity indicators.
b. With master switch "ON," check operation of stall warning transmitter tab and warning horn.
c. Turn off master switch, check ignition switch "OFF," and check that fuel tank selector valve handle is on fullest tank.
d. On first flight of day and after each refueling, pull out strainer drain knob for about four seconds, to clear fuel strainer of possible water and sediment.
e. Remove control wheel lock, if installed.

(2) a. Check baggage door securely latched (left side only).
b. Inspect airspeed static source holes on sides of fuselage for stoppage.

(3) a. Remove gust locks, if installed.
b. Inspect tail surface hinges and hinge bolts.
c. Check trim tab for security.
d. Disconnect tie-down rope or chain.

(4) a. Check aileron and flap hinges.
b. Check navigation light for damage.

(5) a. Check main wheel tire for cuts, bruises and proper inflation.
b. Remove fuel tank cap and check fuel level for agreement with gage reading. Secure cap.
c. Disconnect tie-down rope or chain.
d. Check fuel tank vent opening for stoppage.
e. Check courtesy light for damage.

(6) a. Check windshield for cleanliness.
b. Check propeller and spinner for nicks and security.
c. Examine propeller for oil leaks.
d. Make visual check to insure that fuel strainer drain valve is closed after draining operation.
e. Check nose wheel strut for proper inflation.
f. Check nose wheel tire for cuts, bruises and proper inflation.
g. Disconnect tie-down rope.
h. Check oil level. Do not operate with less than nine quarts. Fill for extended flight.
i. Inspect cowl access doors for security.
j. Inspect radio ventilation air intake scoop on side of fuselage for stoppage (left side only).

(7) a. Remove pitot tube cover, if installed.
b. Inspect pitot tube opening for stoppage.

Figure 2-1.

Section 2

205

OPERATING CHECK LIST

This section lists, in Pilot's Check List form, the steps necessary to operate your airplane efficiently and safely. It is not a check list in its true form as it is considerably longer, but it does cover briefly all of the points that you would want to or should know concerning the information you need for a typical flight.

The flight and operational characteristics of your airplane are normal in all respects. There are no "unconventional" characteristics or operations that need to be mastered. All controls respond in the normal way within the entire range of operation. All airspeeds mentioned in Sections II and III are indicated airspeeds. Corresponding true indicated airspeeds may be obtained from the Airspeed Correction Table in Section VI.

BEFORE ENTERING THE AIRPLANE.

(1) Make an exterior inspection in accordance with figure 2-1.

BEFORE STARTING THE ENGINE.

(1) Seats and Seat Belts -- Adjust and lock.
(2) Flight Controls -- Check.
(3) Brakes -- Test and set.
(4) Master Switch -- On.
(5) Cowl Flaps -- "OPEN."
(6) Elevator and Rudder Trim -- Set.
(7) Fuel Selector -- Fullest tank.

STARTING ENGINE.

(1) Mixture - Full Rich.
(2) Propeller - High RPM.
(3) Throttle - Closed.
(4) Auxiliary Fuel Pump Switch - On "LO."

NOTE

The auxiliary fuel pump will not operate until the ignition switch is turned to the "START" position.

(5) Crank engine.
(6) Slowly advance throttle with vernier.
(7) Release ignition key when engine starts.

NOTE

If engine fails to continue running, start again from step (3).

(8) Reset throttle to desired idle speed.
(9) Auxiliary Fuel Pump Switch - "OFF."

BEFORE TAKE-OFF.

(1) Induction Air -- Cold.
(2) Throttle Setting -- 1700 RPM.
(3) Engine Instruments -- Within green arc.
(4) Ammeter -- Check.
(5) Magnetos -- Check (50 RPM maximum differential between magnetos).
(6) Propeller -- Check.
(7) Flight Controls -- Recheck.
(8) Wing Flaps -- 0° to 20°.
(9) Cowl Flaps -- Full "OPEN."
(10) Elevator and Rudder Trim -- Take-off setting.
(11) Cabin Doors -- Closed and locked.
(12) Flight Instruments and Radios -- Set.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Power -- Full throttle.
(2) Elevator Control -- Lift nosewheel at 60 MPH.
(3) Brakes -- Apply momentarily (when airborne).
(4) Climb Speed -- 100 MPH until all obstacles are cleared, then set up climb speed as shown in "NORMAL CLIMB" paragraph.
(5) Wing Flaps -- Retract (if extended).

MAXIMUM PERFORMANCE TAKE-OFF.

(1) Wing Flaps -- 20°.

(2) Brakes -- Apply.
(3) Power -- Full throttle and 2625 RPM.
(4) Mixture -- Lean for field elevation.
(5) Brakes -- Release.
(6) Elevator Control -- Maintain slightly tail-low attitude.
(7) Climb Speed -- 78 MPH until all obstacles are cleared, then set up climb speed as shown in "MAXIMUM PERFORMANCE CLIMB" paragraph.
(8) Wing Flaps -- Retract after obstacles are cleared.

CLIMB.

NORMAL CLIMB.

(1) Air Speed -- 110 to 120 MPH.
(2) Power -- 24 inches and 2450 RPM.
(3) Mixture -- Lean for altitude as necessary.
(4) Cowl Flaps -- 1/2 to full "OPEN," as required.

MAXIMUM PERFORMANCE CLIMB.

(1) Air Speed -- 99 MPH (sea level) to 91 MPH (10, 000 feet).
(2) Power -- Full throttle and 2625 RPM.
(3) Mixture -- Lean for altitude.
(4) Cowl Flaps -- Full "OPEN."

CRUISING.

(1) Power -- 15-24 inches of manifold pressure and 2200-2450 RPM.
(2) Cowl Flaps -- Adjust to maintain normal cylinder head temperature.
(3) Elevator and Rudder Trim -- Adjust.
(4) Mixture -- Lean for cruise fuel flow as determined from your Cessna Power Computer or from the tables on pages 6-4 thru 6-8.

LET-DOWN.

(1) Mixture -- Rich.
(2) Power -- As desired.

BEFORE LANDING.

(1) Fuel Selector -- Fullest tank.
(2) Mixture -- Rich.
(3) Airspeed -- 90-100 MPH (flaps retracted).
(4) Propeller -- High RPM.

(5) Flaps -- Down 10° - 40° (below 110 MPH).
(6) Airspeed -- 80-90 MPH (flaps extended).
(7) Elevator and Rudder Trim -- Adjust.

NORMAL LANDING.

(1) Landing Technique -- Conventional for all flap settings.

AFTER LANDING.

(1) Cowl Flaps -- "OPEN."
(2) Wing Flaps -- Retract.
(3) Mixture -- Idle cut-off.
(4) Ignition Switch -- "OFF."
(5) Master Switch -- Off.
(6) Brakes -- Set.

Section 3

205

OPERATING DETAILS

The following paragraphs cover in somewhat greater detail the items entered as a Check List in Section II. Not every item in the list is discussed here. Only those items of the Check List that require further explanation will be found in this section.

PREFLIGHT CHECK.

The exterior inspection described in Section II is recommended for the first flight of the day. Inspection procedures for subsequent flights normally are limited to brief checks of the tail surface hinges, fuel and oil quantity, and security of fuel and oil filler caps. If the airplane has been subjected to long-term storage, recent major maintenance, or operation from marginal airports, a more extensive exterior inspection is recommended.

After major maintenance has been performed, the flight and trim controls should be double-checked for free and correct movement.

The security of all inspection plates on the airplane should be checked following periodic inspections. If the airplane has been waxed and polished, it is a good practice to check the external static pressure source holes for stoppage.

If the airplane has been exposed to much ground handling in a crowded hangar, it should be checked for dents and scratches on wings, fuselage, and tail surfaces, as well as damage to navigation and landing lights, and radio antennas. Outside storage for long periods may result in water and obstructions in the airspeed system lines, condensation in fuel tanks, and dust and dirt on the intake air filter and engine cooling fins.

Operation from a gravel or cinder field will require extra attention to propeller tips and abrasion on leading edges of the horizontal tail. Stone damage to the outer six inches of the propeller tips can seriously reduce the fatigue life of the blades.

Airplanes that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. A frequent check of all components of the landing gear, tires, and brakes is important.

The interior inspection will vary according to the mission and the optional equipment installed. Before high altitude flights, it is important to check the condition and

quantity of oxygen face masks and hoses. The oxygen supply system should be functionally checked to insure that it is in working order. The oxygen pressure gage should indicate between 300 and 1800 psi, depending upon the anticipated requirements.

Satisfactory operation of the pitot tube and stall warning transmitter heating elements is determined by turning on the heater and cautiously feeling the heat of both devices.

If night flying is anticipated, all exterior and interior lights should be checked for proper illumination.

STARTING ENGINE.

The use of an external power source is recommended for starting in cold weather. Before connecting a generator type external power source it is important that the master switch be turned on. This will enable the battery to absorb transient voltages which might damage the transistors in the audio amplifier. When using a battery type cart the master switch should be turned off.

Proper fuel management and throttle adjustments are the determining factors in securing an easy start from your continuous-flow fuel-injection engine. The procedure outlined in Section II should be followed closely as it is effective under nearly all operating conditions, including hot and cold weather conditions. Slight variations from this procedure may be necessary at times to compensate for extreme conditions.

Conventional full rich mixture and high RPM propeller settings are used for starting; the throttle, however, should be fully closed initially. When ready to start, depress the right half of the auxiliary fuel pump switch to "LO" and turn the ignition-starter switch to the "START" position. At the same time the starter engages and turns the engine, the auxiliary fuel pump will operate at a low flow rate, supplying the fuel for starting. While cranking, slowly advance the throttle with the vernier until the engine starts. Slow throttle advancement is essential since the engine will start readily when the correct fuel/air ratio is obtained. On the other hand, fast throttle movement may prevent starting since an excessively rich mixture will be obtained due to the greater fuel flow metered by the throttle position. In this case, another starting attempt must be made. When the engine has started, reset the throttle to the desired idle speed and turn the auxiliary fuel pump switch "OFF."

If prolonged cranking is necessary, allow the starter motor to cool at frequent intervals, since excessive heat may damage the armature.

TAXIING.

The induction hot air knob should be pushed full in during all ground operations unless heat is absolutely necessary for smooth engine operation. When the knob is pulled out to the heat position, air entering the engine is not filtered.

Release the parking brake before taxiing and use the minimum amount of power necessary to start the airplane moving. During taxi, and especially when taxiing downwind, the RPM should be held down to prevent excessive taxi speeds. Taxiing should be done at a speed slow enough to make the use of brakes almost entirely unnecessary. Using the brakes as sparingly as possible will prevent undue wear and strain on tires, brakes, and landing gear. Normal steering is accomplished by applying pressure to the rudder pedal in the direction the airplane is to be turned. For smaller radius turns, at slow speed, the brakes may be used on the inside wheel. At slow taxi speed, this airplane may be pivoted about the outboard strut fitting without sliding the tires. When taxiing in crosswinds it is important that speed and use of brakes be held to a minimum and that all controls be utilized to maintain directional control and balance.

NOTE

Caution should be used when taxiing over rough fields to avoid excessive loads on the nosewheel. Rough use of brakes and power also add to nosewheel load. A good rule of thumb: "Use minimum speed, power, and brakes."

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips. Full throttle run-ups over loose gravel are especially harmful to propeller tips. When take-offs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it.

BEFORE TAKE-OFF.

Most of the warm up will have been conducted during taxi, and additional warm up before take-off should be restricted to the checks outlined in Section II. Since the engine is closely cowled for efficient in-flight cooling, precautions should be taken to avoid overheating on the ground. Full throttle checks on the ground are not recommended unless the pilot has good reason to suspect that the engine is not turning up properly.

An operational check of the magneto ignition system is important before take-off. An RPM drop on single ignition is a natural characteristic of dual ignition design in modern engines. The purpose of the magneto check is to determine that all cylinders are firing. If all cylinders are not firing, the engine will run extremely rough and cause for investigation will be quite apparent. The amount of RPM drop is not necessarily significant and will be influenced by ambient air temperature, humidity, airport altitude, and other factors. An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing has been "bumped-up" and is set in advance of the setting specified. Magneto checks should be performed on a comparative basis between individual right and left magneto performance.

The magneto check should be made at 1700 RPM with the propeller in flat pitch as follows: Move the ignition switch first to "R" position and note RPM. Then move switch back to "BOTH" position to clear the other set of plugs. Then move switch to "L" position and note RPM. The difference between the two magnetos operated singularly should not be more than 50 RPM. If there is a doubt concerning the operation of the ignition system, RPM checks at a higher engine speed will usually confirm whether a deficiency exists.

If instrument or night flights are contemplated, a careful check should be made of vacuum pump operation. A suction of 4.5 inches of mercury is desirable for gyro instruments. However, a range of 3.75 to 5.0 inches of mercury is considered acceptable. On aircraft having an optional pictorial gyro horizon and azimuth card directional gyro, a suction gage is not installed. The suction gage is unnecessary since the gyro horizon incorporates two lights used for warning of high or low suction. When neither light is on, the suction rate is acceptable. A vacuum lights test switch in the system provides a means of testing the lights electrically. The condition of the generator is also important since satisfactory operation of all radio equipment and electrical instruments is essential to instrument flight. The condition of the generator is checked by noting that the ammeter is not showing a discharge with the engine speed above 1000 RPM.

A simple last-minute recheck of important items should include a glance to see that the mixture and propeller pitch knobs are full in, all flight controls have free and correct movement, and the fuel selector is on the fullest tank.

TAKE-OFF.

It is important to check full-throttle engine operation early in the take-off run. Any signs of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off.

For maximum engine power, the mixture should be adjusted during the initial take-off roll to the fuel flow corresponding to the field elevation. The power increase is significant above 3000 feet and this procedure always should be employed for field elevations greater than 5000 feet above sea level.

Using 20° wing flaps reduces the ground run and total distance over the obstacle by approximately 10 per cent. Soft field take-offs are performed with 20° flaps by lifting the nosewheel off the ground as soon as practical and leaving the ground in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed of 75 MPH.

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after take-off. The airplane is accelerated to a speed slightly higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

AFTER TAKE-OFF.

To set up the airplane in climb configuration, adjust power for climb, retract the wing flaps at a safe altitude and airspeed (90 MPH), and adjust the mixture for the power setting selected.

Power reduction will vary according to the requirements of the traffic pattern, surrounding terrain, gross weight, field elevation, temperature, and engine condition. However, a normal "after-take-off" power setting is 24 inches of manifold pressure and 2450 RPM.

CLIMB.

A cruising climb at 24 inches of manifold pressure, 2450 RPM (approximately 75% power) and 110 to 120 MPH is recommended to save time and fuel for the overall trip. In addition, this type of climb provides better engine cooling, less engine wear, and more passenger comfort due to lower noise level.

The mixture should be leaned as necessary for the lower powers available at altitude.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the best rate-of-climb speed should be used with maximum power. This speed is 99 MPH at sea level, decreasing approximately 1 MPH for each 1000 feet above sea level. During maximum-performance climbs, the mixture should be leaned in accordance with the altitude scale of the take-off and climb dial range to assure maximum power and sufficient engine cooling.

If an obstruction ahead requires a steep climb angle, the airplane should be flown at the best angle-of-climb with flaps up and maximum power. This speed is 75 MPH at sea level, increasing 1/2 MPH for each 1000 feet above sea level.

CRUISE.

Tabulated cruising information for normal cruising power and altitudes is presented in Section VI. These charts are based on both 63.5 gallons and 80 gallons (optional) of fuel for cruise, normal lean mixture, 3300 pounds gross weight, zero wind, and no fuel reserve. Allowances for warm-up, take-off, and climb (see page 6-3), headwinds, variations in mixture leaning technique, and fuel reserve should be estimated, and the endurance and range shown in the charts should be modified accordingly.

Since the main advantage of the airplane over ground transportation is speed, you usually will prefer high cruising speeds. However, if a destination is slightly out of reach in one flight at normal cruising speeds, it may save time and money to make the trip non-stop at lower speed. The cruising charts show the long ranges obtainable with lower cruising speeds.

Normal cruising is done between 65% and 75% power. The power settings required to obtain these powers at various altitudes and outside air

OPTIMUM CRUISE PERFORMANCE

% BHP	GAL/HR	ALTITUDE	TRUE AIRSPEED	RANGE (STD. TANKS)
75	14.1	6500	162	730
70	13.2	8000	160	770
65	12.2	10,000	158	820

Figure 3-1.

temperatures can be determined by using your Cessna Power Computer.

Cruising power of approximately 75% is obtained with 24 inches of manifold pressure and 2450 RPM. Various percent powers can be obtained with an infinite number of combinations of manifold pressures, engine speeds, altitudes, and outside air temperatures. However, at full throttle, a constant engine speed and a standard air temperature, a specific power may be obtained at only one altitude. For example, at full throttle, 2450 RPM and normal lean mixture, the Optimum Cruise Performance table (figure 3-1) shows speed and range figures for various powers and optimum altitudes.

This table shows that cruising can be done most efficiently at higher altitudes because very nearly the same cruising speed can be maintained at much less power. This means a saving in fuel consumption and engine wear.

To achieve level-flight performance shown in the cruising charts in Section VI, the mixture should be leaned to the correct fuel flow as determined from your Cessna Power Computer or the charts, pages 6-4 thru 6-8.

This should result in normal lean mixtures which will yield airspeeds only slightly below those available at best power. For example, at 75% power at 6500 feet, the cruising speed is 163 MPH with best power mixture and 162 MPH with the recommended normal lean mixture. Since normal lean mixture gives considerably lower fuel consumption and, therefore, longer range, this technique offers an optimum compromise between speed and fuel consumption for normal cruising flight.

Should maximum speed be desirable for short flights where range and fuel consumption are less important, the mixture should be set approximately 1 GPH above the fuel flow shown on your Cessna Power Computer for any normal power range. This setting will give approximately best power mixture and will result in a 1 MPH increase in airspeed.

The cowl flaps should be adjusted

to maintain the cylinder head temperature near the middle of the normal operating (green arc) range to assure prolonged engine life.

For a given throttle setting, select the lowest engine speed in the green arc range that will give smooth engine operation with no evidence of engine laboring.

The fuel injection system employed on this engine is considered to be non-icing. An induction air heat system is incorporated, however, to assure satisfactory operation in the event that unusual atmospheric conditions should cause intake system icing. The induction hot air knob should be left in the full cold position for all normal operations. Should intake system icing be encountered, the knob should be pulled out to the full heat position.

STALLS.

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 MPH above the stall in all configurations.

Power-off stall speeds at maximum gross weight and aft c.g. position are presented on page 6-2 as true indicated airspeeds because indicated airspeeds are inaccurate near the stall.

SPINS.

Intentional spins are prohibited in this airplane. Should an inadvertent spin occur, standard light plane recovery techniques should be used.

LET-DOWN.

Let-downs should be initiated sufficiently before the destination is reached to permit a gradual rate of descent at cruising speed, using just enough power to hold engine temperature in the green arc range.

LANDING.

Landings are simple and conventional in all respects. Either power-off or power-approach type landings can be executed with any flap setting. Although power-off approaches with full flaps are adequately steep, slips are permissible if necessary.

Approach speeds should be approximately 90-100 MPH with flaps up and 80-90 MPH with flaps extended.

Landings are usually made on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway after the speed has diminished to avoid unnecessary nose gear load. This procedure is especially important in rough field landings.

Heavy braking in the normal landing roll is not recommended because of the probability of skidding the main wheels, with resulting loss of braking effectiveness and damage to the tires.

For short field landings, make a power-off approach at 83 MPH with 40° flaps and land on main wheels first. Immediately after touchdown, lower the nose gear and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the

flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

COLD WEATHER OPERATION.

When very cold temperatures are anticipated, the oil should be diluted before stopping the engine if external pre-heat is not available.

The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engine and the electrical system. In addition, pre-heat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures. If external pre-heat is used, the warm-up should be held to a minimum to prevent recongealing the oil in the oil cooler.

In very cold weather, no oil temperature indication need be apparent before take-off. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), the airplane is ready for take-off if it accelerates smoothly and the oil pressure is normal and steady.

During let-down, observe engine temperatures closely and carry sufficient power to maintain them in the recommended operating range.

For continuous operation in temperatures consistently below 20° F, the Cessna winterization kit, available from your Cessna Dealer, should be installed to improve engine operation.

OIL DILUTION SYSTEM.

If your airplane is equipped with an oil dilution system and very low temperatures are anticipated, dilute the oil prior to engine shut down by energizing the oil dilution switch with the engine operating at 1000 RPM, and with the auxiliary fuel pump switch in the "HI" position. (Refer to figure 3-2 for dilution time for the anticipated temperature).

OIL DILUTION TABLE

	TEMPERATURE		
	0°F	-10°F	-20°F
DILUTION TIME	2 min.	5 min.	8 min.
FUEL ADDED	1 qt.	2.5 qt.	4 qt.

Maximum Sump Capacity - 16 quarts
Maximum for Take-off - 13 quarts

Figure 3-2.

While diluting the oil, the oil pressure should be watched for any unusual fluctuations that might indicate a screen being clogged with sludge washed down by the fuel.

NOTE

On the first operation of the oil dilution system each season, use the full dilution period, drain the oil, clean the screen, refill with new oil and redilute as required.

If the full dilution time was used, beginning with a full oil sump (12 quarts), subsequent starts and engine warm-up should be prolonged to evaporate enough of the fuel to lower the oil sump level to 13 quarts prior to take-off. Otherwise, the sump may overflow when the airplane is nosed up for climb.

To avoid progressive dilution of the oil, flights of at least one hour's duration should be made between oil dilution operations.

NOTES

Section 4

205

OPERATING LIMITATIONS

OPERATIONS AUTHORIZED.

Your Cessna with standard equipment, as certificated under FAA Type Certificate No. 3A21, is approved for day and night operation under VFR.

Additional optional equipment is available to increase its utility and to make it authorized for use under IFR day and night. An owner of a properly-equipped Cessna is eligible to obtain approval for its operation on single-engine scheduled airline service under VFR. Your Cessna Dealer will be happy to assist you in selecting equipment best suited to your needs.

MANEUVERS—NORMAL CATEGORY.

The airplane exceeds the requirements for airworthiness of the Civil Air Regulations, Part 3, set forth by the United States Government. Spins and aerobatic maneuvers are not permitted in normal category airplanes in compliance with these regulations. In connection with the foregoing, the following gross weight and flight load factors apply:

Maximum Gross Weight . . . . . 3300 lbs.
Flight Load Factor *Flaps Up . . . . . +3.8, -1.52
Flight Load Factor *Flaps Down . . . . . +3.0

*The design load factors are 150% of the above, and, in all cases, the structure meets or exceeds design loads.

Your airplane must be operated in accordance with all FAA-approved markings, placards, and check lists in the airplane. If there is any information in this section which contradicts the FAA-approved markings, placards, and check lists, it is to be disregarded.

AIRSPEED LIMITATIONS.

The following are the certificated true indicated airspeed limits for your Cessna:

Never Exceed (Glide or dive, smooth air) . . . . 210 MPH (red line)
Caution Range . . . . . 170-210 MPH (yellow arc)

Maximum Structural Cruising Speed . . . . . .170 MPH
(Level flight or climb)
Normal Operating Range. . . . . .70-170 MPH (green arc)
Maximum Speed, Flaps Extended 40° . . . . . .110 MPH
Flap Operating Range . . . . . .61-110 MPH (white arc)
Maneuvering Speed*. . . . . .138 MPH

*The maximum speed at which abrupt control travel can be used without exceeding the design load factor.

ENGINE OPERATION LIMITATIONS.

Power and Speed . . . . . .260 BHP at 2625 RPM

ENGINE INSTRUMENT MARKINGS.

OIL TEMPERATURE INDICATOR.

Normal Operating Range. . . . . Green Arc
Do Not Exceed . . . . . Red Line

OIL PRESSURE GAGE.

Idling Pressure . . . . . 10 psi (red line)
Normal Operating Range . . . . . 30-60 psi (green arc)
Maximum Pressure . . . . . .100 psi (red line)

MANIFOLD PRESSURE GAGE.

Normal Operating Range . . . . . .15-24 in. Hg (green arc)

CYLINDER HEAD TEMPERATURE GAGE.

Normal Operating Range . . . . . 300-460°F (green arc)
Do Not Exceed . . . . . .460°F (red line)

TACHOMETER.

Normal Operating Range. . . . . 2200-2450 rpm (green arc)
Maximum (Engine rated speed). . . . . 2625 rpm (red line)

FUEL QUANTITY INDICATORS.

Empty (.7 gallon unusable each tank) . . . . . E (red line)

FUEL FLOW INDICATOR.

Normal Operating Range . . . . . 8.0-14.5 gal/hr (green arc)
Minimum and Maximum . . . . . .2.0 and 21.4 gal/hr (red lines)
Maximum Performance Take-Off and Climb Settings at Altitude:
Sea Level . . . . . 19.5 gal/hr (white radial)
4000 Ft . . . . . 17.6 gal/hr (white radial)
8000 Ft . . . . . 15.8 gal/hr (white radial)

WEIGHT AND BALANCE.

The information presented in this section will enable you to operate your Cessna within the prescribed weight and center of gravity limitations.

In figuring your loading problems be certain that you use the Licensed Empty Weight of your particular airplane as shown on its Weight and Balance Data sheet. This sheet, plus an Equipment List, is included with each airplane as it leaves the factory. The FAA requires that any change in the original equipment affecting the empty weight center of gravity be recorded on a Repair and Alteration Form FAA-337.

READ BEFORE WORKING LOADING PROBLEM FOR YOUR AIRPLANE

To figure the weight for your airplane in the same manner as the sample problem on page 4-4, proceed as follows:

Step 1. Take the licensed Empty Weight and Moment/1000 from the Weight and Balance Data Sheet, plus any changes noted on forms FAA-337, carried in your airplane and write them down in two columns in the manner shown in the sample problem. These figures are non-variables and, unless your airplane or equipment is modified, these figures may be used every time you figure your weight and balance.

Step 2. Write down the weight and moment/1000 for the oil in the proper columns. Since you usually have a full load of oil for a trip, you figure 12 qts. at 22.5 lbs. and a moment of -0.4. You may use these same figures every time and consider this also a non-variable.

Step 3. Add the weight of yourself and the front passenger. Refer to the Loading Graph on page 4-5 and find this weight at the left side of the graph, then go across the graph horizontally to the right until you intersect the line identified as "PILOT AND FRONT PASSEN-

SAMPLE LOADING PROBLEM

205

	Sample Airplane		Your Airplane	
	Weight (lbs)	Moment (lb.-ins. /1000)	Weight	Moment
1. Licensed Empty Weight (Sample Airplane)	1800.5	60.4		
2. Oil - 12 Qts.*	22.5	-0.4	22.5	-0.4
3. Pilot & Front Passenger	340.0	12.2		
4. Fuel - (63.5 Gal. at 6#/Gal)	381.0	18.3		
5. Center Passengers	340.0	23.5		
6. Aft Passengers	340.0	34.0		
7. Total Aircraft Weight (Loaded)	3224.0	147.9		

8. Locate this point (3224.0 at 147.9) on the center of gravity envelope, and since this point falls within the envelope the loading is acceptable.

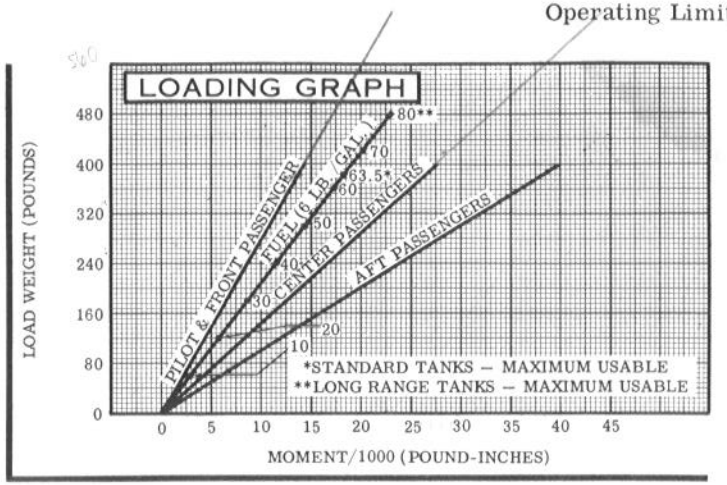
*Note: Normally full oil may be assumed for all flights.

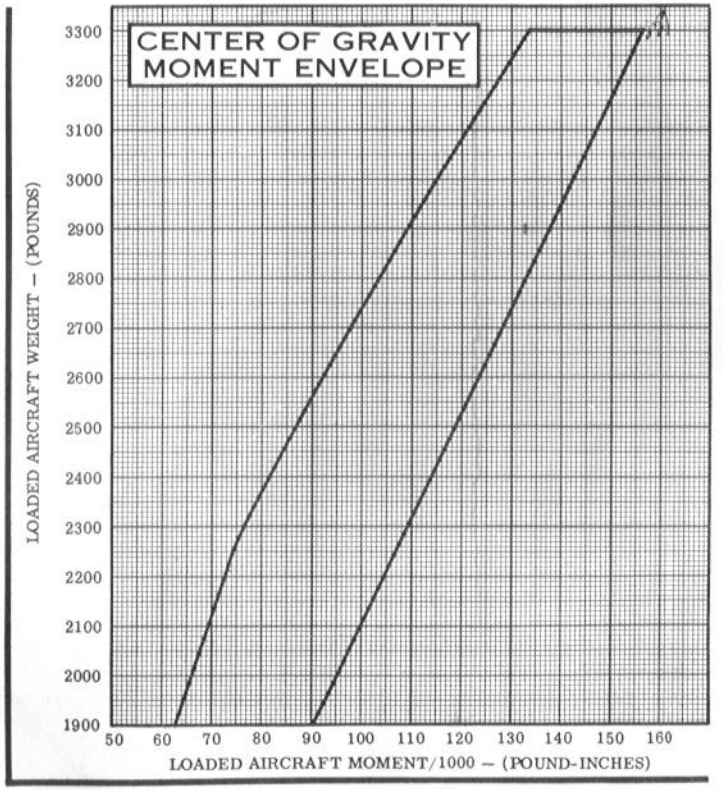
GER." After intersecting the line, drop down vertically to the bottom line and read the moment/1000 given on the scale. Now write down this weight and moment/1000 for you and the front passenger in the proper columns.

Step 4. Proceed as you did in step 3, except use the line identified as "FUEL" and 6 lbs. per gallon for the amount of gasoline you are carrying, and read the moment/1000 from the Loading Graph. Write the weight and moment/1000 in the proper columns.

Step 5. Proceed as you did in step 3, except use the line identified as "CENTER PASSENGERS," and read the moment/1000 for the combined weight of the center seat passengers being carried. Write the weight and moment/1000 in the proper columns.

Step 6. Proceed as you did in step 3, except use the line identified as "AFT PASSENGERS," and read the moment/1000 for the combined weight of the aft seat passengers being carried. Write the weight and moment/1000 in the proper columns.





Step 7. Add the weight column. The total must be 3300 lbs., or below, or you must lighten your aircraft load. Add the moment column (remember to subtract rather than add the oil moment because it is a minus quantity).

Step 8. Refer to the Center of Gravity Moment Envelope. Locate the total weight on the scale on the left hand side of the graph and, from this point, follow a line horizontally to the right. Locate the total moment/1000 on the scale running across the bottom of the graph and, from this point, follow a line vertically up until you intersect the line running horizontally from your total weight. If the point where the two lines intersect is within the envelope, your airplane is loaded within approved limits. If the point of intersection falls outside the envelope, your load must be adjusted before flight.

CARE OF THE AIRPLANE

If your airplane is to retain that new-plane performance and dependability, certain inspection and maintenance requirements must be followed. It is wise to follow a planned schedule of lubrication and preventative maintenance based on climatic and flying conditions encountered in your locality.

Keep in touch with your Cessna Dealer, and take advantage of his knowledge and experience. He knows your airplane and how to maintain it. He will remind you when lubrications and oil changes are necessary, and about other seasonal and periodic services.

GROUND HANDLING.

The airplane is most easily and safely maneuvered during ground handling by the tow-bar attached to the nosewheel.

NOTE

When using the tow-bar, do not exceed the nosewheel turning radius of 35° either side of center.

When moving the airplane by hand and no tow-bar is available, push down at the front spar of the stabilizer beside the fuselage to raise the nosewheel off the ground. With the nosewheel clear of the ground the airplane can be turned readily in any direction by pivoting it around the main gear. Do not push down on the empennage by the tip of the elevator; nor shove sidewise on the upper portion of the fin. When moving the airplane forward, push at the wing strut root fitting or at the main gear strut.

MOORING YOUR AIRPLANE.

Proper tie-down procedure is your best precaution against damage to your parked airplane by gusty or strong winds. To tie-down your airplane securely, proceed as follows:

(1) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing tie-down fittings at the upper end of each wing strut. Secure the opposite ends of these ropes or chains to tie-down rings.
(2) Tie a rope through the nose gear torque link and secure the opposite end to a tie-down ring.
(3) Securely tie the middle of a length of rope to the ring at the tail. Pull each end of the rope

away at a 45° angle and secure it to tie-down rings positioned on each side of the tail.
(4) Install a surface control lock over the fin and rudder. Do not use external locks between the flaps and ailerons, because accidental operation of the flaps could cause structural damage to both flaps and ailerons.
(5) Install the control lock in the control wheel shaft.

STORAGE.

The all-metal construction of your Cessna makes outside storage of it practical, although inside storage will increase its life just as it increases the life of your car. If your airplane must remain inactive for a time, cleanliness is probably the most important consideration — whether your airplane is inside or out. A small investment in cleanliness will repay you many times, not only in keeping your airplane looking like new but in keeping it new. A later paragraph in this section covers the subject in greater detail.

Do not neglect the engine when storing the airplane. Turn the propeller over by hand or have it turned over every few days to keep the engine bearings, cylinder walls and internal parts lubricated. If storage is to be for an extended period, and turning the propeller is impractical, see your Cessna Dealer for suggestions on preserving the engine. If the airplane is stored outside, leave the propeller in a horizontal position to prevent water seepage into the hub mechanism. Filling the fuel tanks will help prevent condensation.

Regular use helps keep airplanes in good condition. An airplane left standing idle for any great length of time is likely to deteriorate more rapidly than if it is flown regularly, and should be carefully checked before being put back into active service.

WINDSHIELD-WINDOWS.

The plastic windshield and windows should be kept clean and waxed at all times. To prevent scratches and crazing, wash them carefully with plenty of soap and water, using the palm of the hand to feel and dislodge dirt and mud. A soft cloth, chamois or sponge may be used, but only to carry water to the surface. Rinse thoroughly, then dry with a clean, moist chamois. Rubbing the surface of the plastic with a dry cloth builds up an electrostatic charge so that it attracts dust particles in the air. Wiping with a moist chamois will remove both the dust and this charge.

Remove oil and grease with a cloth moistened with kerosene. Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher or anti-ice fluid, lacquer thinner or glass cleaner. These materials will soften the plastic and may cause it to craze.

After removing dirt and grease, if the surface is not badly scratched it should be waxed with a good grade of commercial wax. The wax will fill in minor scratches and help prevent further scratching. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer; the heat generated by the buffing pad may soften the plastic.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated. Canvas covers may scratch the plastic surface.

PAINTED SURFACES.

The painted exterior surfaces of your new Cessna have been finished with high grade synthetic materials selected for their toughness, elasticity, and excellent adhesion. With a minimum of care, they will retain their original beauty for many years.

As with any paint applied to a metal surface, the desired qualities of the paint develop slowly throughout an initial curing period which may be as long as 90 days after the finish is applied. During this curing period some precautions should be taken to avoid damaging the finish or interfering with the curing process. The finish should be cleaned only by washing with clean, cold water and mild soap, followed by a rinse with cold water and drying with cloths or a chamois. Do not use polish or wax, which would exclude air from the surface. Do not rub or buff the finish and avoid flying through rain, hail or sleet. Once the finish has cured completely, it may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wings and tail and on the nose cap and propeller spinner will help reduce the abrasion encountered in these areas.

Fluids containing dyes, such as fuel and hydraulic oil, accidentally spilled on the painted surface, should be flushed away at once to avoid a permanent stain. Battery electrolyte must be flushed off at once, and the area neutralized with an alkali such as baking soda solution, followed by a thorough rinse with clear water.

PROPELLER CARE.

Preflight inspection of propeller blades for nicks, and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long, trouble-free service. It is vital that small nicks on the propeller, particularly near the tips and on the leading edges, are dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with carbon tetrachloride or Stoddard solvent.

Your Cessna Dealer should be consulted about other repair and maintenance work. Civil Air Regulations require that all maintenance except dressing small blade nicks, cleaning, minor repairs to the spinner, and lubrication which does not require disassembly, be done by an FAA - authorized propeller repair station.

INTERIOR CARE.

To remove dust and loose dirt from the upholstery and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly, with cleansing tissue or rags. Don't pat the spot - press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent read the instructions on the container and test it on an obscure place in the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

Soiled upholstery and carpet may be cleaned with foam-type detergent, used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

The plastic trim, headliner, instrument panel and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with kerosene. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

INSPECTION SERVICE AND INSPECTION PERIODS.

With your airplane you will receive an Owner's Service Policy. Coupons attached to the policy entitle you to an initial inspection and the first 100-hour inspection at no charge. If you take delivery from your Dealer, he will perform the initial inspection before delivery of the airplane to you. If you pick up the airplane at the factory, plan to take it to your Dealer reasonably soon after you take delivery on it. This will permit him to check it over and to make any minor adjustments that may appear necessary. Also, plan an inspection by your Dealer at 100 hours or 90 days, whichever comes first. This inspection also is performed by your Dealer for you at no charge. While these important inspections will be performed for you by any Cessna Dealer, in most cases you will prefer to have the Dealer from whom you purchase the airplane accomplish this work.

Civil Air Regulations require that all airplanes have a periodic (annual) inspection as prescribed by the administrator, and performed by a person designated by the administrator. In addition, 100-hour periodic inspections made by an "appropriately-rated mechanic" are required if the airplane is flown for hire. The Cessna Aircraft Company recommends the 100-hour periodic inspection for your airplane. The procedure for this 100-hour inspection has been carefully worked out by the factory and is followed by the Cessna Dealer Organization. The complete familiarity of the Cessna Dealer Organization with Cessna equipment and with factory-approved procedures provides the highest type of service possible at lower cost.

Time studies of the 100-hour inspection at the factory and in the field have developed a standard flat-

rate charge for this inspection at any Cessna Dealer. Points which the inspection reveals require modification or repairs will be brought to the owner's attention by the Dealer, and quotations or charges will be made accordingly. The inspection charge does not include the oil required for the oil change.

Every effort is made to attract the best mechanics in each community to Cessna service facilities. Many Dealers' mechanics have attended Cessna Aircraft Company schools and have received specialized instructions in maintenance and care of Cessna airplanes. Cessna service instruction activity in the form of service bulletins and letters is constantly being carried on so that when you have your Cessna inspected and serviced by Cessna Dealers' mechanics, the work will be complete and done in accordance with the latest approved method.

Cessna Dealers carry a full complement of Cessna service parts and have complete repair and service facilities, including such specialized jigs and tools as may be necessary.

Your Cessna Dealer will be glad to give you current price quotations on all parts that you might need and advise you on the practicality of parts replacement versus repairs that may be necessary from time to time.

AIRPLANE FILE.

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a check list for that file. In addition, a periodic check should be made of the latest Civil Air Regulations to insure that all data requirements are met.

A. To be displayed in the airplane at all times:
(1) Aircraft Airworthiness Certificate (Form FAA-1362).
(2) Aircraft Registration Certificate (Form FAA-500A).

B. To be carried in the airplane at all times:
(1) Airplane Radio Station License (if transmitter installed).
(2) Weight and Balance Report or latest copy of the Repair and Alteration Form (Form FAA-337).
(3) Airplane Equipment List.
(4) Airplane Log Book.
(5) Engine Log Book.

C. To be maintained but not necessarily carried in the airplane at all times:
(1) A form containing the following information: Model, Registration Number, Factory Serial Number, Date of Manufacture, Engine Number, and Key Numbers (duplicate keys are available through your Cessna Dealer).

Most of the items listed are required by the United States Civil Air Regulations. Since the regulations of other nations may require other documents and data, owners of exported airplanes should check with their own aviation officials to determine their individual requirements.

LUBRICATION AND SERVICING

Specific lubrication and servicing information is presented in the Servicing Diagram (figure 5-1). For quick reference, specifications and quantities of fuel, oil, etc., are contained in a table on the inside back cover. In addition to those items specified in the Servicing Diagram, all pulleys, the trim tab actuator rod, bellcrank clevis bolts, brake pedal pivots, rudder pedal crossbars, shimmy dampener pivot bushings, door hinges and latches, Bowden controls (with the exception of their friction locking devices), engine control linkage, and any other friction points should be lubricated every 1000 hours, or oftener, with SAE 20 engine oil. Do not lubricate friction locks.

Generally, roller chains (aileron, elevator trim tab wheel and tab actuator) and control cables collect dust, sand and grit if they are greased or oiled. Except under seacoast conditions, chains and cables should be merely wiped clean occasionally with a dry cloth.

DEALER FOLLOW-UP SYSTEM 205

Your Cessna Dealer has an owner follow-up system to notify you when he receives information that applies to your Cessna. In addition, if you wish, you may choose to receive similar notification directly from the Cessna Service Department. A subscription card is supplied in your airplane file for your use, should you choose to request this service. Your Cessna Dealer will be glad to supply you with details concerning these follow-up programs, and stands ready through his Service Department to supply you with fast, efficient, low cost service.

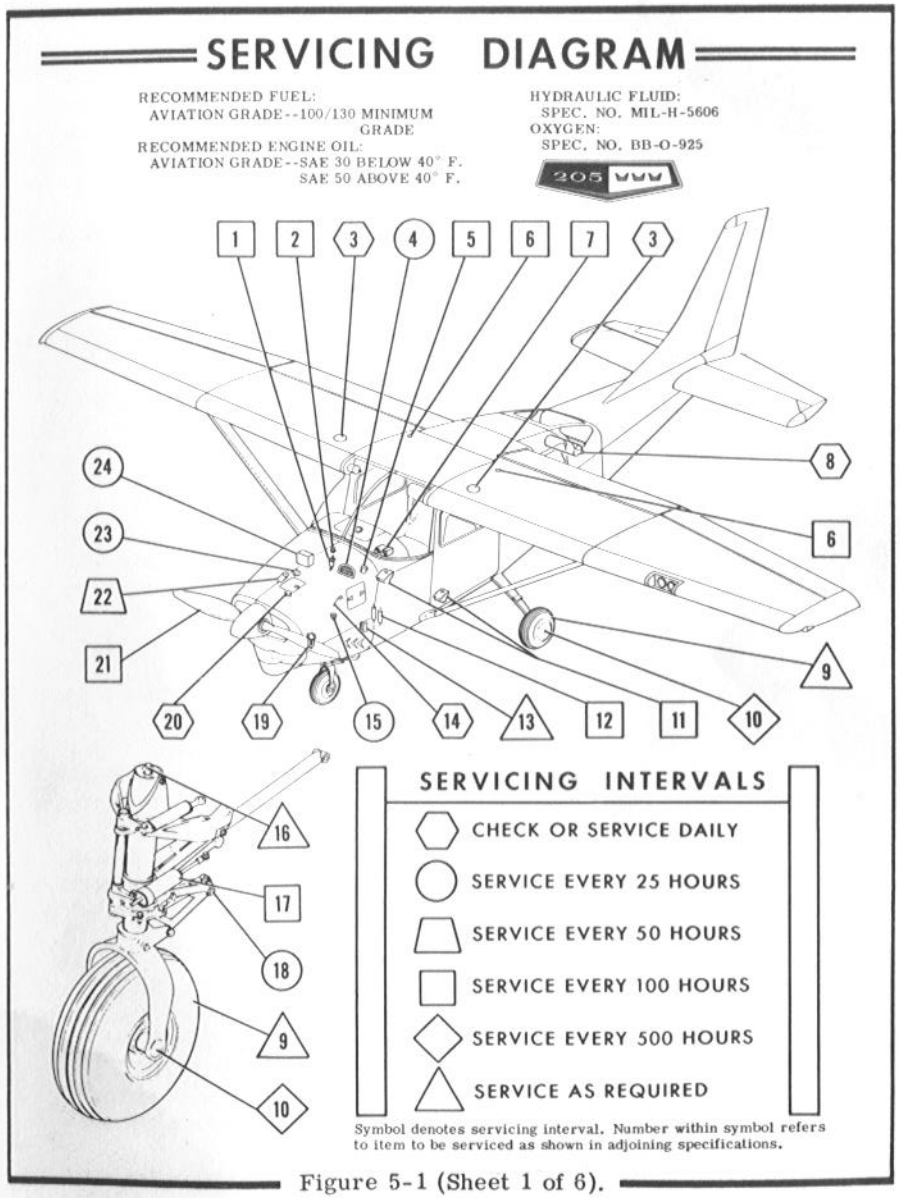


Figure 5-1 (Sheet 1 of 6).

SERVICING PROCEDURES

For convenience, the items below are segregated into servicing intervals; that is, all items which must be checked or serviced daily are listed, then items requiring 25 hour service are listed, etc. The numbered symbol at each item refers to the item as shown in the Servicing Diagram.

⬡ DAILY

(3) FUEL TANK FILLERS
Service after each flight with 100/130 minimum grade fuel. The capacity of each tank is 32.5 gallons. When optional long range fuel tanks are installed, the capacity of each tank is 42.0 gallons.

(8) OXYGEN CYLINDER AND FILLER VALVE (OPT)
Check oxygen pressure gage for anticipated requirements before each flight. Whenever pressure drops below 300 psi, use filler valve on left side of utility shelf and refill cylinder with aviator's breathing oxygen (Spec. No. BB-O-925). Maximum pressure, 1800 psi.

(14) OIL DIPSTICK
Check oil level before each flight. Do not operate on less than 9 quarts and fill if an extended flight is planned. The oil capacity is 12 quarts (13 quarts capacity if an optional oil filter is installed).

(19) FUEL STRAINER
Drain approximately two ounces of fuel before each flight and after refueling to remove water and sediment. Make sure drain valve is closed after draining. Disassemble and clean bowl and screen every 100 hours.

(20) OIL FILLER
When preflight check shows low oil level, service with aviation grade engine oil; SAE 30 below 40° F. and SAE 50 above 40° F. Your Cessna was delivered from the factory with straight mineral oil (non-detergent) and should be operated with straight mineral oil for the first 25 hours. The use of mineral oil during the 25-hour break-in period will help seat the piston rings and will result in less oil consumption. After the first 25 hours, either mineral oil or detergent oil may be used. If a detergent oil is used it must conform to Continental Motors Corporation Specification MHS-24. Your Cessna Dealer can supply an approved brand.

Figure 5-1 (Sheet 2 of 6).

○ 25 HOURS

(4) INDUCTION AIR FILTER
Service every 25 hours or oftener when operating in dusty conditions. Under extremely dusty conditions, daily maintenance of the filter is recommended. Service filter in accordance with instructions on the filter frame.

(15) OIL SUMP DRAIN
Every 25 hours, change engine oil. Drain oil by removing plug in oil sump. Provide protection for engine nacelle when draining. (See item 22 for servicing interval on aircraft equipped with an optional oil filter.)

(18) NOSE GEAR TORQUE LINKS
Every 25 hours, lubricate through grease fittings with MIL-G-7711 general purpose grease. Wipe off excess.

(23) ENGINE OIL SCREEN
Remove and wash screen (located on right rear side of engine accessory section) with Stoddard solvent (Fed. Spec. P-S-661) whenever engine oil is changed. (On aircraft equipped with an optional oil filter, the engine oil screen has been removed and replaced with an adapter unit for oil filtration.)

(24) BATTERY
Check level of electrolyte every 25 hours (or at least every 30 days), oftener in hot weather. Maintain level by adding distilled water. DO NOT overfill. Immediately neutralize spilled electrolyte with baking soda solution, then flush with water. Keep battery clean and connections tight. Neutralize corrosion deposits with baking soda solution, then rinse thoroughly.

Figure 5-1 (Sheet 3 of 6).

50 HOURS

22 OIL FILTER (OPT)
Change engine oil and replace filter element every 50 hours. Oil should be changed at least every four months even though less than 50 hours have accumulated. If the engine is operated in extremely dusty areas, in cold climates where sludging conditions exist, or where short flights and long idle periods are encountered which cause sludging conditions, the interval for changing oil should be reduced from the 50 hour interval outlined above.

100 HOURS

1 VACUUM SYSTEM OIL SEPARATOR (OPT)
Every 100 hours, remove separator and flush with Stoddard solvent (Fed. Spec. P-S-661), then dry with compressed air and reinstall.

2 FUEL/AIR CONTROL UNIT SCREEN
Every 100 hours, remove and clean the screen in the bottom of the fuel/air control unit, reinstall and resafety.

5 SUCTION RELIEF VALVE INLET SCREEN (OPT)
Every 100 hours, check inlet screen for dirt or obstructions if suction gage readings appear high. Remove screen and clean with compressed air or wash with Stoddard solvent (Fed. Spec. P-S-661).

6 FUEL TANK SUMP DRAINS
Every 100 hours, remove drain plugs, drain off water and sediment, and reinstall plugs. Safety wire plugs to adjacent safety screws.

7 GYRO INSTRUMENT AIR FILTERS (OPT)
Replace every 100 hours and when erratic or sluggish responses are noted with normal suction gage readings.

11 FUEL RESERVOIR DRAIN PLUGS
Every 100 hours, remove drain plug from bottom of each fuel

Figure 5-1 (Sheet 4 of 6).

reservoir, drain off water and sediment, and reinstall plug. Safety wire plug to adjacent fuselage structure.

12 BRAKE MASTER CYLINDERS
Every 100 hours, check fluid level in brake master cylinders. Fill with MIL-H-5606 (red) hydraulic fluid. Filling with a pressure pot connected to the brake bleeder ports is preferable, although fluid may be poured through the plugs on the top of the master cylinders.

17 SHIMMY DAMPENER
Every 100 hours, check fluid level in shimmy dampener. Fill with MIL-H-5606 hydraulic fluid.

21 PROPELLER
The McCauley propeller mechanism is sealed and does not require lubrication between overhauls. Grease the Hartzell propeller every 100 hours, using any good quality general purpose lithium base waterproof grease. To prevent entrapping air and high pressure, remove one of the grease fittings at each blade, then fill with grease through the opposite fitting at each blade. Fill the fittings until grease oozes from the holes from which the fittings were removed.

500 HOURS

10 WHEEL BEARINGS
Repack with MIL-G-7711 or aircraft wheel bearing grease at first 100 hours, 500 hours thereafter; oftener if more than the usual amount of water, mud, ice or snow is encountered.

AS REQUIRED

9 TIRES
Maintain pressure of 45 psi on the 5.00 × 5 nosewheel tire (35 psi on optional 6.00 × 6 tire) and 53 psi on the 6.00 × 6 main wheel tires (35 psi on optional 8.00 × 6 tires). Remove

Figure 5-1 (Sheet 5 of 6).

oil and grease from tires with soap and water; periodically inspect them for cuts, bruises and wear.

13 GROUND SERVICE RECEPTACLE (OPT)

Connect to 12-volt, DC, negative-ground power unit for cold weather starting and lengthy ground maintenance of the electrical system. Review Section III, paragraph "STARTING ENGINE" for position of master switch when using various external power sources.

16 NOSE GEAR SHOCK STRUT

Keep strut inflated and filled with MIL-H-5606 (red) hydraulic fluid. See Service Manual for detailed instructions.

The military specifications listed are not mandatory, but are intended as guides in choosing satisfactory materials. Products of most reputable manufacturers meet or exceed these specifications.

Figure 5-1 (Sheet 6 of 6).

OPERATIONAL DATA

The operational data charts on the following pages are presented for two purposes: first, so that you may know what to expect from your airplane under various conditions; and second, to enable you to plan your flights in detail and with reasonable accuracy.

A power setting selected from the range charts usually will be more efficient than a random setting, since it will permit accurate fuel flow settings and your fuel consumption can be estimated closely. You will find that using the charts and your Power Computer will pay dividends in over-all efficiency.

The data in the charts has been compiled from actual flight tests with the airplane and engine in good condition and using average piloting techniques. Note also that the range charts make no allowances for wind, navigational errors, warm-up, take-off, climb, etc. You must estimate these variables for yourself and make allowances accordingly.

AIRSPEED CORRECTION TABLE

FLAPS 0°							
IAS - MPH	60	80	100	120	140	160	180
TIAS - MPH	70	82	101	121	141	161	181
*FLAPS 20°							
IAS - MPH	50	60	70	80	90	100	110
TIAS - MPH	63	66	71	79	88	98	109
*FLAPS 40°							
IAS - MPH	50	60	70	80	90	100	110
TIAS - MPH	55	60	68	77	86	96	107

*Maximum flap speed 110 MPH-TIAS

Figure 6-1.

STALL SPEED, POWER OFF

GROSS WEIGHT 3300 LBS.	ANGLE OF BANK			
CONFIGURATION	0°	20°	40°	60°
FLAPS UP	67	69	77	95
FLAPS 20°	60	62	68	84
FLAPS 40°	57	59	65	81

SPEEDS ARE MPH, TIAS

Figure 6-2.

TAKE-OFF DATA

TAKEOFF DISTANCE WITH 20° FLAPS FROM HARD-SURFACED RUNWAY, NO WIND

GROSS WEIGHT POUNDS	IAS @ 50 FT MPH	HEAD WIND MPH	@ SEA LEVEL & 59°F		@ 2500 FT. & 50°F		@ 5000 FT. & 41°F		@ 7500 FT. & 32°F	
			GROUND RUN	TO CLEAR 50' OBSTACLE (INCLUDES GRD RUN)	GROUND RUN	TO CLEAR 50' OBSTACLE (INCLUDES GRD RUN)	GROUND RUN	TO CLEAR 50' OBSTACLE (INCLUDES GRD RUN)	GROUND RUN	TO CLEAR 50' OBSTACLE (INCLUDES GRD RUN)
2300	65	0	360	750	425	865	510	1020	620	1245
		15	195	485	240	570	290	680	365	850
		30	80	270	100	325	130	400	170	510
2800	72	0	505	1040	595	1230	710	1510	870	1960
		15	290	705	355	850	430	1060	540	1405
		30	135	425	170	525	220	675	285	925
3300	78	0	685	1465	815	1805	980	2390	1205	3745
		15	420	1030	505	1295	620	1755	780	2835
		30	215	660	265	850	340	1195	440	2015

NOTE: INCREASE DISTANCES 10% FOR EACH 20°F ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

CLIMB DATA

GROSS WEIGHT POUNDS	@ SEA LEVEL & 59°F			@ 5000 FT. & 41°F			@ 10,000 FT. & 23°F			@ 15,000 FT. & 5°F			@ 20,000FT. & -12°F		
	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL OF FUEL USED
2300	95	1670	2.0	90	1320	3.0	85	975	4.2	80	630	5.7	73	385	8.0
2800	97	1260	2.0	93	965	3.4	88	665	5.1	83	370	7.5	78	70	12.7
3300	99	965	2.0	95	695	3.9	90	425	6.4	87	160	10.8	--	--	--

NOTE: FULL THROTTLE, 2625 RPM, MIXTURE AT RECOMMENDED LEANING SCHEDULE, FLAPS UP, FUEL USED INCLUDES WARM-UP AND TAKEOFF ALLOWANCE.

Figure 6-3.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-3300 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	63.5 GAL(NO RESERVE)		80 GAL(NO RESERVE)	
					ENDR. HOURS	RANGE MILES	ENDR. HOURS	RANGE MILES
2450	24	74	156	14.0	4.5	705	5.7	890
	23	70	152	13.2	4.8	730	6.1	925
	22	66	149	12.4	5.1	760	6.4	960
	21	62	145	11.7	5.4	790	6.9	995
2300	24	68	151	12.8	5.0	745	6.2	940
	23	65	147	12.1	5.2	770	6.6	970
	22	61	144	11.4	5.6	800	7.0	1005
	21	57	140	10.8	5.9	825	7.4	1040
2200	23	60	143	11.3	5.6	805	7.1	1015
	22	57	140	10.7	6.0	830	7.5	1045
	21	53	136	10.1	6.3	855	7.9	1080
	20	50	132	9.5	6.7	880	8.4	1110
2100	22	52	135	9.9	6.4	865	8.1	1090
	21	49	131	9.3	6.8	890	8.6	1120
	20	46	127	8.8	7.2	910	9.1	1150
	19	42	122	8.4	7.6	930	9.6	1170
	18	39	118	7.9	8.1	945	10.1	1195
	17	36	112	7.4	8.5	960	10.8	1210
	16	33	107	7.0	9.1	970	11.5	1220

Figure 6-4 (Sheet 1 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-3300 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	63.5 GAL(NO RESERVE)		80 GAL(NO RESERVE)	
					ENDR. HOURS	RANGE MILES	ENDR. HOURS	RANGE MILES
2450	24	77	162	14.5	4.4	705	5.5	890
	23	73	158	13.7	4.6	735	5.9	925
	22	68	154	12.9	4.9	760	6.2	960
	21	64	151	12.1	5.3	790	6.6	995
2300	24	70	156	13.2	4.8	750	6.0	945
	23	67	153	12.5	5.1	775	6.4	975
	22	63	149	11.8	5.4	800	6.8	1010
	21	59	145	11.1	5.7	830	7.2	1045
2200	23	62	148	11.6	5.5	810	6.9	1020
	22	58	145	11.0	5.8	835	7.3	1055
	21	55	141	10.4	6.1	860	7.7	1085
	20	51	137	9.8	6.5	890	8.2	1120
2100	22	53	139	10.1	6.3	875	7.9	1100
	21	50	136	9.6	6.6	895	8.3	1130
	20	47	131	9.1	7.0	920	8.8	1160
	19	44	127	8.6	7.4	940	9.3	1185
	18	41	122	8.1	7.8	955	9.9	1205
	17	37	117	7.6	8.3	970	10.5	1225
	16	34	111	7.2	8.8	980	11.1	1235

Figure 6-4 (Sheet 2 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-3300 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	63.5 GAL(NO RESERVE) ENDR. HOURS	63.5 GAL(NO RESERVE) RANGE MILES	80 GAL(NO RESERVE) ENDR. HOURS	80 GAL(NO RESERVE) RANGE MILES
2450	22	71	160	13.3	4.8	765	6.0	960
	21	66	156	12.5	5.1	795	6.4	1000
	20	62	152	11.7	5.4	825	6.8	1040
	19	58	148	10.9	5.8	855	7.3	1080
2300	22	65	154	12.2	5.2	805	6.6	1015
	21	61	151	11.5	5.6	835	7.0	1050
	20	57	146	10.8	5.9	865	7.4	1090
	19	53	142	10.1	6.3	895	7.9	1125
2200	22	60	150	11.3	5.6	840	7.1	1060
	21	57	146	10.7	6.0	870	7.5	1095
	20	53	142	10.1	6.3	895	8.0	1125
	19	50	137	9.5	6.7	920	8.4	1160
2100	21	52	140	9.9	6.4	905	8.1	1140
	20	49	136	9.3	6.8	925	8.6	1165
	19	45	132	8.8	7.2	950	9.1	1195
	18	42	127	8.3	7.6	965	9.6	1220
	17	39	122	7.9	8.1	980	10.2	1240
	16	36	116	7.4	8.6	995	10.8	1250
	15	32	109	6.9	9.2	1000	11.6	1260

Figure 6-4 (Sheet 3 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-3300 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	63.5 GAL(NO RESERVE) ENDR. HOURS	63.5 GAL(NO RESERVE) RANGE MILES	80 GAL(NO RESERVE) ENDR. HOURS	80 GAL(NO RESERVE) RANGE MILES
2450	20	64	158	12.1	5.3	830	6.6	1045
	19	60	153	11.3	5.6	860	7.1	1085
	18	56	148	10.5	6.0	895	7.6	1125
	17	52	143	9.8	6.5	925	8.2	1165
2300	20	59	152	11.1	5.7	870	7.2	1095
	19	55	147	10.4	6.1	900	7.7	1135
	18	51	142	9.7	6.5	930	8.2	1170
	17	47	137	9.1	7.0	955	8.8	1205
2200	20	55	147	10.4	6.1	900	7.7	1135
	19	51	142	9.7	6.5	930	8.2	1170
	18	48	137	9.2	6.9	955	8.7	1200
	17	44	132	8.6	7.4	975	9.3	1230
2100	20	50	141	9.6	6.6	935	8.3	1175
	19	47	137	9.1	7.0	955	8.8	1205
	18	44	132	8.6	7.4	975	9.4	1230
	17	40	126	8.1	7.9	995	9.9	1250
	16	37	120	7.6	8.4	1005	10.6	1270
	15	34	114	7.1	8.9	1015	11.2	1275

Figure 6-4 (Sheet 4 of 5).

CRUISE PERFORMANCE

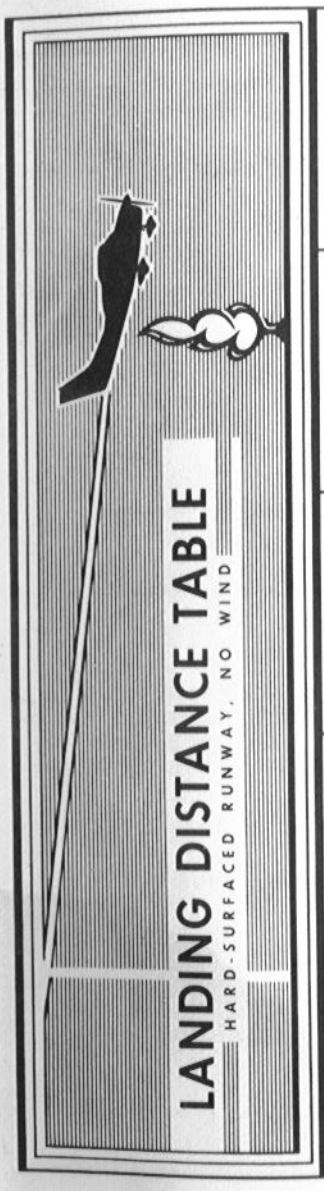
NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-3300 Pounds

15,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	63.5 GAL(NO RESERVE) ENDR. HOURS	63.5 GAL(NO RESERVE) RANGE MILES	80 GAL(NO RESERVE) ENDR. HOURS	80 GAL(NO RESERVE) RANGE MILES
2450	16	51	148	9.7	6.6	970	8.3	1220
	15	47	141	9.0	7.1	1000	8.9	1255
	14	42	134	8.3	7.6	1020	9.6	1285
	13	38	126	7.7	8.3	1040	10.4	1310
2300	16	47	141	9.0	7.1	1000	8.9	1255
	15	43	135	8.4	7.6	1020	9.6	1285
	14	38	127	7.8	8.2	1035	10.3	1305
	13	34	119	7.2	8.8	1045	11.1	1315
2200	16	43	136	8.5	7.5	1015	9.4	1280
	15	39	129	7.9	8.0	1035	10.1	1300
	14	36	121	7.4	8.6	1045	10.8	1315
2100	16	40	130	8.0	7.9	1030	10.0	1300
	15	36	123	7.5	8.5	1040	10.7	1315

Figure 6-4 (Sheet 5 of 5).



GROSS WEIGHT LBS.	APPROACH IAS MPH	AT SEA LEVEL & 59° F GROUND ROLL	AT SEA LEVEL & 59° F TO CLEAR 50' OBSTACLE (INCLUDES GRD ROLL)	AT 2500 FT & 50° F GROUND ROLL	AT 2500 FT & 50° F TO CLEAR 50' OBSTACLE (INCLUDES GRD ROLL)	AT 5000 FT & 41° F GROUND ROLL	AT 5000 FT & 41° F TO CLEAR 50' OBSTACLE (INCLUDES GRD ROLL)	AT 7500 FT & 32° F GROUND ROLL	AT 7500 FT & 32° F TO CLEAR 50' OBSTACLE (INCLUDES GRD ROLL)
2300	69	435	915	470	965	505	1020	545	1080
2800	77	530	1215	570	1280	615	1350	665	1425
3300	83	625	1510	675	1590	725	1675	785	1770

NOTE: REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND. FLAPS 40° AND POWER OFF.

Figure 6-5.

NOTES

Section 7

205

OPTIONAL SYSTEMS

This section contains a description, operating procedures, and performance data (when applicable) for the "major item" optional equipment systems in your airplane. Only optional equipment requiring detailed coverage, for efficient utilization of the system, is discussed here. Optional equipment of a more simple nature is discussed in other portions of this manual.

RADIO SELECTOR SWITCHES

RADIO SELECTOR SWITCH OPERATION.

Operation of the radio equipment is normal as covered in the respective radio manuals. When more than one radio is installed, an audio switching system is necessary. The operation of this switching system is described below.

TRANSMITTER SELECTOR SWITCH.

The transmitter selector switch has two positions. When two transmitters are installed, it is necessary to switch the microphone and antenna to the radio unit the pilot desires to use for transmission. This is accomplished by placing the transmitter selector switch in position 1 or 2 corresponding to the radio unit which is to be used.

SPEAKER-PHONE SWITCHES.

The speaker-phone switches determine whether the output of the receiver in use is fed to the headphones or through the audio amplifier to the speaker. Place the switch for the desired receiving system either in the up position for speaker operation or in the down position for headphones.

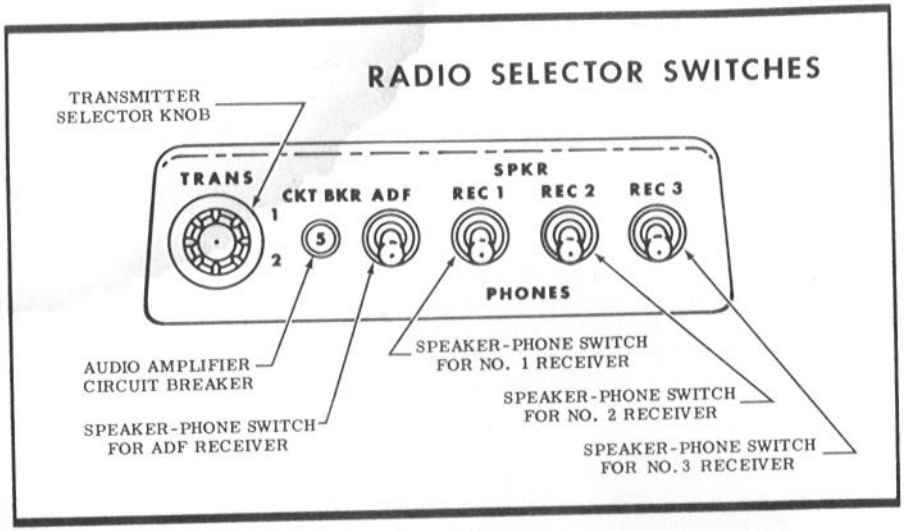


Figure 7-1.

AUDIO AMPLIFIER CIRCUIT BREAKER.

A "push-to-reset" type circuit breaker protects the audio amplifier circuit. Should a malfunction occur, the circuit breaker will pop out. If the malfunction was of a temporary nature, the breaker may be pushed in to reactivate the circuit; however, repeated popping out of the breaker indicates a more serious trouble and no further attempt should be made to reset the breaker and use the cabin speaker. Reposition the speaker-phone switches to "PHONES" for headphone operation which is unaffected by a malfunction in the audio amplifier.

NAV-O-MATIC

DESCRIPTION

NAV-O-MATIC.

The Cessna NAV-O-MATIC flight controller is an electronic, single-axis autopilot featuring a transistorized heading hold circuit.

The NAV-O-MATIC provides complete lateral stability, thereby giving the pilot additional time for navigational and visual flight operation by relieving him of most control duties between take-off and landing. The NAV-O-MATIC also provides heading holding capability. When the autopilot is engaged and trimmed, the airplane will hold a desired heading automatically. System components include a control unit, mounted on the instrument panel (see figure 7-2), an inclined rate gyro, mounted

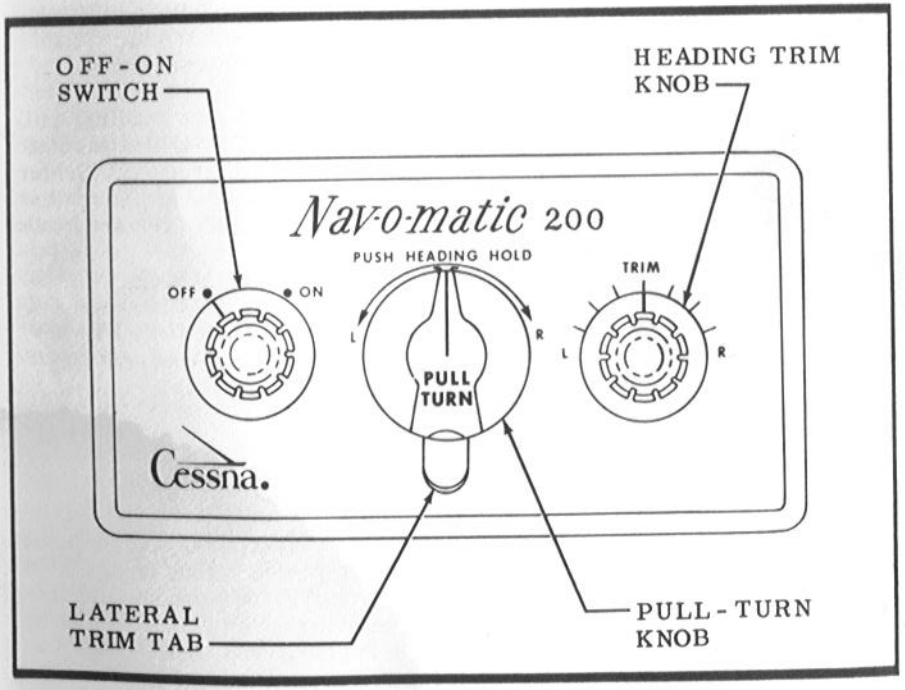


Figure 7-2.

behind the instrument panel, and a motor driven actuator connected to the right aileron bell crank.

OPERATING CHECK LIST

PREFLIGHT CHECK.

NOTE

A pre-flight check need not be performed before each flight. It is primarily used for ground checking the NAV-O-MATIC when a malfunction is suspected or as a periodic, preventive maintenance check. (See page 7-7 for Pre-Flight Ground Check procedure.

TAKE-OFF.

(1) NAV-O-MATIC "OFF-ON" switch in OFF position.

CRUISE.

(1) Trim aircraft for straight flight.
(2) Center all NAV-O-MATIC controls and turn NAV-O-MATIC "OFF-ON" switch ON.
(3) Pull out "PULL-TURN" knob and adjust lateral trim tab as required to level aircraft.
(4) Push in "PULL-TURN" knob to engage heading hold.
(5) Make fine adjustments to hold heading by use of the "TRIM" knob. After each new trim setting, disengage and re-engage "PULL-TURN" knob.

NOTE

Refer to paragraph entitled "USE OF THE NAV-O-MATIC TRIM KNOB" for additional details.

(6) To turn to new heading, pull out "PULL-TURN" knob and rotate it in the desired direction. Center knob and push in when aircraft is on new heading and wings are level.

BEFORE LANDING.

(1) NAV-O-MATIC "OFF-ON" switch in OFF position before entering traffic pattern.

OPERATING DETAILS

It is recommended that the NAV-O-MATIC not be engaged prior to take-off. Forces applied to the control system by the autopilot are easily overpowered; however, these forces could significantly alter the "feel" of the aircraft controls.

The NAV-O-MATIC requires no warm-up period before engagement since the system employs transistors and the rate gyro is operating when the aircraft's master switch is on. It is not mandatory that the procedure listed in the Operating Check List for engaging the autopilot be used, but it will result in the smoothest engagement. If the setting of the autopilot is different from the trim of the aircraft at the time the autopilot is engaged, it will cause a brisk change of attitude; however, no excessive loads will be imposed on the airplane.

Although the autopilot may be easily overpowered at any time, this practice should be minimized since some servo clutch wear will result from long periods of manually overpowering the system.

An aircraft out of trim condition will result in the NAV-O-MATIC causing the aircraft to fly with one wing low to maintain a heading. If objectional, this can be corrected by centering the ball in the turn and bank indicator with the rudder pedals or the rudder trim control.

The "PULL-TURN" knob can be used to turn to a new heading by pulling out to disengage the heading hold circuit and turning in the desired direction. When the aircraft is on the new heading, center the knob and push in to re-engage the heading circuit.

USE OF THE NAV-O-MATIC TRIM KNOB.

The heading "TRIM" knob is used to balance the internal electrical circuits of the NAV-O-MATIC system. Temperature changes or environmental conditions may cause the internal circuitry of the system to become electrically unbalanced. Through use of the "TRIM" knob, the internal circuitry can be adjusted so that the airplane has no tendency to drift due to unbalanced electrical signals.

With the "TRIM" knob adjusted so that the internal circuits are balanced, the autopilot will make corrective action only on airplane attitude changes. In this condition, the NAV-O-MATIC will hold a heading for extended periods of time.

The heading "TRIM" knob is used as follows:

(1) With aircraft trimmed for level flight at desired heading, push "PULL-TURN" knob in.

NOTE

The heading "TRIM" knob should be in centered position.

(2) Note initial heading and observe any noticeable heading drift. Do not be hasty about adjusting "TRIM" knob. Allow several minutes to determine the rate-of-drift.

NOTE

Use the magnetic compass to check drift. A precessing gyro compass would give a false indication of airplane drift.

(3) If airplane is drifting, turn heading "TRIM" knob one half graduation in the opposite direction from turn. Allow several minutes to determine new rate and direction of drift.

NOTE

After each new trim setting, dis-

engage and re-engage "PULL-TURN" knob. This erases the original electrical memory circuit and speeds up autopilot response for the new setting.

(4) If aircraft continues to drift in the same direction, continue to move heading "TRIM" knob in opposite direction of turn.

NOTE

The knob usually will not require as large a movement as before. For example, if rate-of-drift appears to be half that originally experienced, move knob one-fourth graduation; if drift rate is approximately one fourth, move knob one eighth graduation; etc.

(5) If aircraft starts to drift in the opposite direction, too much corrective trim has been applied. Rotate the heading "TRIM" knob in the opposite direction from the turn a distance proportionate to the turn rate.
(6) Make subsequent corrections of heading "TRIM" knob settings until the aircraft is holding the heading.

NOTE

Progressively finer adjustments of the heading "TRIM" knob will be required as the aircraft drift rate diminishes. Accurate judgment as to the amount of progressive knob movements required is quickly gained thru experience using the NAV-O-MATIC.

(7) Once the "TRIM" knob has been set to hold a heading, the unit should operate for extended periods of time without changing the knob setting. Do not touch the "TRIM" knob unless you are sure that the aircraft is drifting, in level flight, in respect to the magnetic compass. Do not be impatient. The NAV-O-MATIC temporarily may drift 1° to 5° to one side of course due to rough air. But, it should correct with an opposite drift to the other side and then return to your original heading. In rough air, the NAV-O-MATIC will "average out" on your heading. Temporary oscillation from course is normal.
(8) Changes in power settings or altitude should not affect the "TRIM" knob setting. During the time that power is being reduced or increased, or while the airplane is diving or climbing, the NAV-O-MATIC may change heading. However, once the aircraft has stabilized in level flight, at the new altitude or power setting, the NAV-O-MATIC will again hold a heading within the same accuracy that it held the original heading before the power or altitude change. If heading has changed, steer aircraft back onto original heading with the "PULL-TURN" knob and push knob in to re-engage heading hold. Do not move the heading "TRIM" knob.

EMERGENCY PROCEDURES

If a malfunction should occur in any of the autopilot units, it can be overridden merely with pressure on the normal flight controls, and the entire autopilot may be disengaged by turning the NAV-O-MATIC "OFF-ON" switch OFF.

PREFLIGHT GROUND CHECK.

To ground check the NAV-O-MATIC, start the engine and proceed as follows:

(1) Center all NAV-O-MATIC controls and pull "PULL-TURN" knob out. Allow 3-5 minutes for gyro to stabilize at operating speed.

NOTE

Check that master switch and circuit breaker are ON.

(2) Turn "OFF-ON" switch ON. Actuator should move ailerons to level flight position (control wheels slightly deflected to right).
(3) Turn "PULL-TURN" knob to full right. Note aileron response. Rotate knob full left. Control wheels should rotate in direction of turn and then slowly return to a setting part way back to level flight attitude. Reset "PULL-TURN" knob to center position.
(4) Over-ride actuator by manually turning control wheel to left and then right. When released from each position, the wheel should return to level flight position.

NOTE

On some aircraft, ailerons may not return to level flight attitude if control wheel is deflected to full left position. This is due to the variation in control system rigging permitting the follow-up potentiometer of the NAV-O-MATIC to be rotated more than 180 degrees. By slightly turning control wheel toward neutral, the NAV-O-MATIC will return the ailerons to level flight position. This condition cannot occur in flight due to air loads.

(5) Push "PULL-TURN" knob in and turn heading "TRIM" knob full left. Control wheel should rotate slowly to left. Turn "TRIM" knob full right. Control wheel should rotate slowly to right.
(6) Turn the aircraft left and right, while taxiing, and observe control wheel motion. As the aircraft is turned right, the control wheel should turn to the left. As the aircraft is turned left, the control wheel should turn right.

OXYGEN SYSTEM

An oxygen system, supplying oxygen through seven individual outlets, is available as optional equipment. The system is completely automatic and requires no manual regulation for change of altitude or flow shut-off when the system is not in use.

The system consists of an oxygen cylinder, filler valve, pressure gage, pressure regulator, outlet couplings, and six disposable oxygen face masks, complete with vinyl plastic hoses and flow indicators. The face masks and hoses are stored in a plastic bag, normally stowed on the utility shelf when use is not anticipated.

The oxygen cylinder and shut-off valve are located behind the baggage compartment wall. Oxygen, under high pressure, flows from the cylinder to a pressure gage and an automatic pressure regulator which supplies filtered, low pressure oxygen to the seven individual outlet couplings. The pressure gage, regulator, and five of the outlet couplings are located in the overhead console panel. The two remaining couplings are mounted in the aft cabin ceiling. When the oxygen mask hoses are plugged into the quick-disconnect outlet couplings, a continuous flow of oxygen is supplied to each mask. A flow indicator in each mask supply line shows if oxygen is flowing.

IMPORTANT

Permit no smoking when using oxygen. Oil, grease, soap and other fatty materials in contact with oxygen constitute a serious fire hazard. Be sure hands and clothing are oil-free before handling oxygen equipment.

OXYGEN SYSTEM OPERATION.

Prior to flight, check to be sure that there is an adequate oxygen supply for the trip, by noting the oxygen pressure gage reading. Refer to the Oxygen Duration Chart (figure 7-4). See that the plastic bag containing the face masks and hoses is accessible, and that the masks and hoses are in good condition.

To use the oxygen system, proceed as follows:

(1) Select mask and hose from plastic bag.
(2) If mask is not connected to hose, attach by inserting plastic tube on mask into rubber hose connector on delivery hose.
(3) Attach mask to face.
(4) Select oxygen outlet coupling in overhead console panel or two-port outlet manifold, and plug delivery hose into it. Oxygen will flow continuously at the proper rate-of-flow for any altitude without any manual adjustments.
(5) Check the flow indicator in the face mask hose. Oxygen is flowing if the red indicator compresses its return spring.

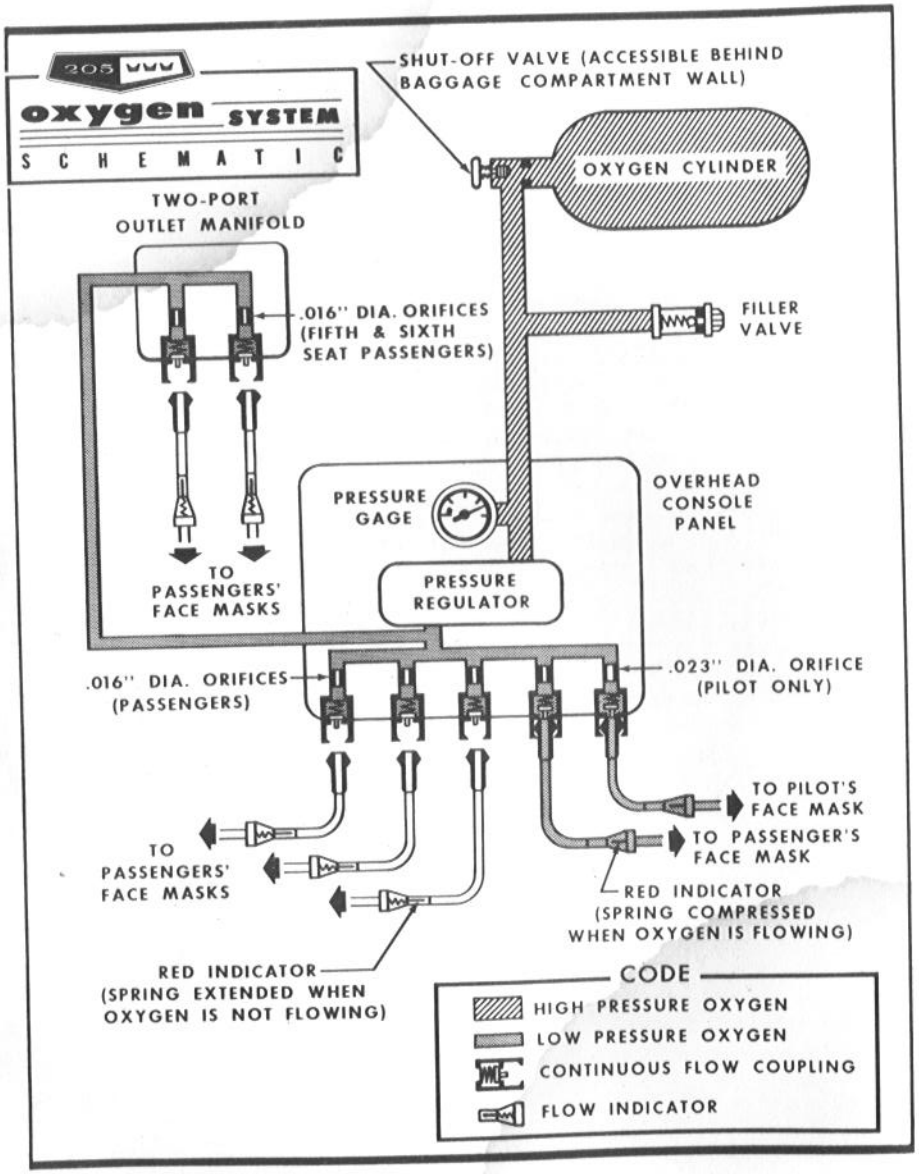


Figure 7-3.

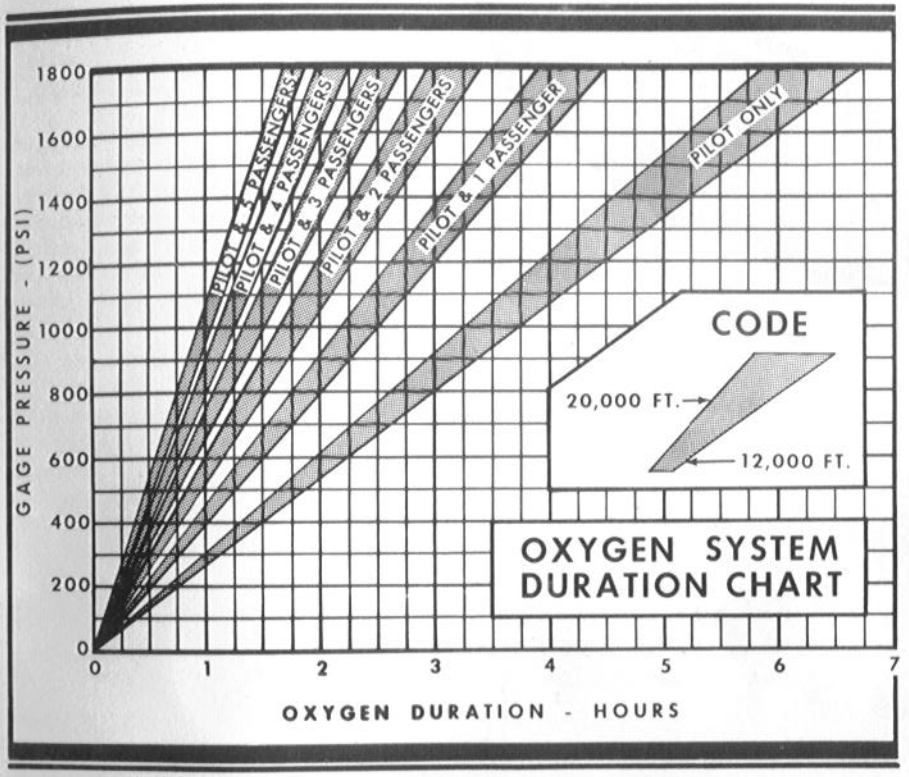


Figure 7-4.

NOTE

The left console outlet (labeled "PILOT") meters approximately twice the volume of oxygen metered by the other outlets.

(6) Unplug the delivery hose from the overhead console and two-port outlet manifold when discontinuing use of the oxygen system. This automatically stops the flow of oxygen.

OXYGEN SYSTEM SERVICING.

The oxygen cylinder, when fully charged, contains 48 cubic feet of oxygen, under a pressure of 1800 psi at 70°F. It should be refilled, whenever the oxygen pressure gage indicates less than 300 psi, with aviator's breathing oxygen (Fed. Spec. No. BB-O-925, or equivalent). For servicing convenience, a filler valve is located on the left side of

the utility shelf near the baggage door.

IMPORTANT

Oil, grease, or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided. Only a thread compound approved under MIL-T-5542 can be used safely on oxygen systems. Apply only to the first three threads of male fittings to prevent thread seizure.

The face masks used with the oxygen system are the partial-rebreathing, disposable type. The masks are durable and the frequent user can mark his mask for identification and reuse it many times. Additional masks and hoses are available from your Cessna Dealer.

ALPHABETICAL INDEX

A

After Landing, 2-4
After Take-Off, 3-5
Airplane,
  before entering, 2-1
  file, 5-5
  mooring, 5-1
  storage, 5-2
Airspeed Correction Table, 6-1
Airspeed Limitations, 4-1
Ammeter, 1-7
Authorized Operations, 4-1
Auxiliary Fuel Pump, 1-5, 1-7
  switch, 1-4, 1-5, 1-7

B

Battery, 1-7
Battery Contactor, 1-7
Before Entering Airplane, 2-1
Before Landing, 2-3
Before Starting Engine, 2-1
Before Take-Off, 2-2, 3-3

C

Cabin and Baggage Doors, 1-9
Cabin Heating and Ventilating System, 1-8
Cap, Fuel Filler, 1-5
Capacity,
  fuel, inside covers
  oil, inside covers
Care,
  interior, 5-3
  propeller, 5-3
Center of Gravity Moment Envelope, 4-5
Check, Preflight, 3-1
Circuit Breakers, 1-8
Climb, 2-3, 3-5
  maximum performance, 2-3
  normal, 2-3
Climb Data and Take-Off Data Table, 6-3
Cold Weather Operation, 3-8
Controls, Engine, 1-1
Correction Table, Airspeed, 6-1
Cowl Flaps, 1-3
Cruise Performance, Optimum, 3-6
Cruise Performance, 6-4, 6-5, 6-6, 6-7, 6-8
Cruising, 2-3, 3-5

D

Dealer Follow-Up System, 5-6
Diagram,
  electrical power distribution, 1-7
  exterior inspection, 1-12
  fuel flow settings, 1-2
  fuel system schematic, 1-5
  internal cabin dimensions, 1-11
  principal dimensions, iv
  servicing, 5-7
Dilution System, Oil, 3-8
  dilution table, 3-8
  switch, 1-5

Dimensions,
internal cabin, 1-11
principal, iv
Distributor, Fuel, 1-5
Doors, Cabin and Baggage, 1-9
Drain Knob, Fuel Strainer, 1-5, 1-6
Drain Plugs, Fuel Tank Sumps, 1-5

E

Electrical System, 1-6
ammeter, 1-7
battery, 1-7
battery contactor, 1-7
circuit breakers, 1-8
generator, 1-7
ground service receptacle, 1-7
ignition - starter switch, 1-2, 1-7
landing lights, 1-8
magnetos, 1-7
master switch, 1-7
navigation lights, 1-8
power distribution diagram, 1-7
stall warning indicator, 1-8
starter, 1-7
starter contactor, 1-7
voltage regulator, 1-7
Empty Weight, inside cover
Engine, inside cover
before starting, 2-1
controls, 1-1
fuel pump, 1-5
instrument markings, 4-2
instruments, 1-2
operation limitations, 4-2
starting, 2-1, 3-2
Exterior Inspection Diagram, 1-12

F

File, Airplane, 5-5
Flaps, Cowl, 1-3
Flaps, Wing, 1-8
Fuel System, 1-3
auxiliary fuel pump, 1-5, 1-7
auxiliary fuel pump switch, 1-4, 1-5, 1-7
by-pass valve, 1-5
capacity, inside covers
check valve, 1-5
engine fuel pump, 1-5
filler cap, 1-5
filter screen, 1-5
fuel distributor, 1-5
fuel flow indicator, 1-2, 1-5
fuel flow settings diagram, 1-2
fuel nozzles, 1-5
fuel quantity data table, 1-4
fuel quantity indicators, 1-5, 1-6
fuel quantity transmitters, 1-5
fuel reservoir, 1-5
fuel tank, 1-5
fuel unit, 1-5
oil dilution solenoid valve, 1-5
oil dilution switch, 1-5
schematic, 1-5
selector valve, 1-4, 1-5
strainer, 1-5
strainer drain knob, 1-5, 1-6
tank sump drain plugs, 1-5
tank vent, 1-5

G

Generator, 1-7
Graph,
center of gravity moment envelope, 4-5
loading, 4-5
Gross Weight, inside cover
Ground Handling, 5-1
Ground Service Receptable, 1-7

H

Handling Airplane on Ground, 5-1
Heating and Ventilating System, Cabin, 1-8
Hot Air Knob, Induction, 1-1

I

Ignition - Starter Switch, 1-2, 1-7
Indicator,
fuel flow, 1-2, 1-5
fuel quantity, 1-5, 1-6
stall warning, 1-8
Induction Hot Air Knob, 1-1
Inspection Service — Inspection Periods, 5-4
Instrument Markings, Engine, 4-2
Interior Care, 5-3
Internal Cabin Dimensions, 1-11

K

Knob,
fuel strainer drain, 1-5, 1-6
induction hot air, 1-1
mixture control, 1-1, 1-5
propeller control, 1-1
throttle, 1-1, 1-5

L

Landing, inside cover, 2-4, 3-7
after, 2-4
before, 2-3
distance table, 6-9
normal, 2-4
Landing Lights, 1-8
Let-Down, 2-3, 3-7
Lights,
landing, 1-8
navigation, 1-8
Limitations, Airspeed, 4-1
Limitations, Engine Operation, 4-2
Loading, Power, inside cover
Loading, Wing, inside cover
Loading Graph, 4-5
Loading Problem, Sample, 4-4
Lubrication and Servicing, 5-6

M

Magnetos, 1-7
Maneuvers — Normal Category, 4-1
Markings, Engine Instrument, 4-2
Master Switch, 1-7
Maximum Performance Climb, 2-3
Maximum Performance Take-Off, 2-2
Mixture Control, 1-1, 1-5
Moment Envelope, Center of Gravity, 4-5
Mooring Your Airplane, 5-1

N

Navigation Lights, 1-8
Nav-O-Matic, 7-3
before landing, 7-4
cruise, 7-4
emergency procedures, 8-5
heading trim knob, 7-3
lateral trim tab, 7-3
off-on switch, 7-3
preflight check, 7-4

preflight ground check, 7-5
pull-turn knob, 7-3
take-off, 7-4
Normal Category — Maneuvers, 4-1
Normal Climb, 2-3
Normal Landing, 2-4
Normal Take-Off, 2-2
Nozzles, Fuel, 1-5

O

Oil System,
capacity, inside covers
dilution solenoid valve, 1-5
dilution switch, 1-5
dilution system, 3-8
dilution system table, 3-8
Operation, Cold Weather, 3-8
Operation Limitations, Engine, 4-2
Operations Authorized, 4-1
Optimum Cruise Performance, 3-6
Oxygen System, 7-9
cylinder, 7-10
duration chart, 7-11
filler valve, 7-10
flow indicators, 7-10
operation, 7-9
overhead console panel, 7-10
pressure gage, 7-10
pressure regulator, 7-10
schematic, 7-10
servicing, 7-11
shut-off valve, 7-10
two-port outlet manifold, 7-10

P

Painted Surfaces, 5-3
Performance - Specifications, inside cover
Power, inside cover
Power Loading, inside cover
Preflight Check, 3-1
Principal Dimensions Diagram, iv
Propeller, inside cover
care, 5-3
control, 1-1

Q

Quantity Data, Fuel, 1-4
Quantity Indicators, Fuel, 1-5, 1-6
Quantity Transmitters, Fuel, 1-5

R

Radio Selector Switches, 7-1, 7-2
audio amplifier circuit breaker, 7-2
operation, 7-1
speaker-phone, 7-1, 7-2
transmitter selector, 7-1, 7-2
Range, inside cover
Rate of Climb at Sea Level, inside cover
Regulator, Voltage, 1-7

S

Sample Loading Problem, 4-4
Seats, 1-10
Selector Valve, Fuel, 1-4, 1-5
Service Ceiling, inside cover
Servicing Requirements Table, inside back cover
Servicing and Lubrication, 5-6
diagram, 5-7
procedures, 5-8, 5-9, 5-10, 5-11, 5-12

Specifications - Performance, inside cover
Speed, inside cover
Spins, 3-7
Stalls, 3-7
speed chart, 6-2
warning indicator, 1-8
Starter, 1-7
Starting Engine, 2-1, 3-2
Starter - Ignition Switch, 1-2, 1-7
Storage, 5-2
Strainer, Fuel, 1-5
Strainer Drain Knob, Fuel, 1-5, 1-6
Sump Drain Plugs, Fuel Tank, 1-5
Surfaces, Painted, 5-3
Switch,
auxiliary fuel pump, 1-4, 1-5
ignition-starter, 1-2, 1-7
master, 1-7
oil dilution, 1-5
radio selector, 7-1, 7-2
speaker-phone, 7-1, 7-2
transmitter selector, 7-1, 7-2
System,
cabin heating and ventilating, 1-8
dealer follow-up, 5-6
electrical, 1-6
fuel, 1-3
oil dilution, 3-8
oxygen, 7-9

T

Take-Off, inside cover, 2-2, 3-4
after, 3-5
before, 2-2, 3-3
maximum performance, 2-2
normal, 2-2
Take-Off and Climb Data Table, 6-3
Taxiing, 3-2
Throttle, 1-1, 1-5
Transmitters, Fuel Quantity, 1-5

U

Unit, Fuel, 1-5
Useful Load, inside cover

V

Valve, Fuel Check, 1-5
Valve, Fuel Selector, 1-4, 1-5
Vent, Fuel Tank, 1-5
Ventilators, 1-9
Voltage Regulator, 1-7

W

Warning Indicator, Stall, 1-8
Weight,
empty, inside cover
gross, inside cover
Weight and Balance, 4-3
Windshield - Windows, 5-2
Wing Flaps, 1-8
Wing Loading, inside cover

WARRANTY

■ The Cessna Aircraft Company warrants each new aircraft manufactured by it to be free from defects in material and workmanship under normal use and service, provided, however, that this warranty is limited to making good at The Cessna Aircraft Company's factory any part or parts thereof which shall, within six (6) months after delivery of such aircraft to the original purchaser, be returned to Cessna with transportation charges prepaid, and which upon Cessna's examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities on the part of Cessna, and Cessna neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale of its aircraft.

■ This warranty shall not apply to any aircraft which shall have been repaired or altered outside Cessna's factory in any way so as, in Cessna's judgment, to affect the aircraft's stability or reliability, or which aircraft has been subject to misuse, negligence or accident.

SERVICING REQUIREMENTS

205 U-U-U

FUEL:

AVIATION GRADE -- 100/130 MINIMUM GRADE
CAPACITY EACH STANDARD TANK -- 32.5 GALLONS
CAPACITY EACH LONG RANGE TANK -- 42.0 GALLONS

ENGINE OIL:

AVIATION GRADE -- SAE 30 BELOW 40° F.
SAE 50 ABOVE 40° F.
CAPACITY OF ENGINE SUMP -- 12 QUARTS
(DO NOT OPERATE ON LESS THAN 9 QUARTS AND FILL IF EXTENDED FLIGHT IS PLANNED)

HYDRAULIC FLUID:

MIL-H-5606 (RED) HYDRAULIC FLUID

OXYGEN:

AVIATOR'S BREATHING OXYGEN --
SPECIFICATION NO. BB-O-925
MAXIMUM PRESSURE -- 1800 PSI

TIRE PRESSURE:

MAIN WHEELS -- 53 PSI ON 6.00 × 6 TIRES
-- 35 PSI ON 8.00 × 6 TIRES
NOSE WHEEL -- 45 PSI ON 5.00 × 5 TIRE
-- 35 PSI ON 6.00 × 6 TIRE